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The I.E.E. Wiring Rules

THE appearance of the tenth edition of the Regulations for the Electrical Equipment of Buildings—commonly called the I.E.E. Wiring Rules—is particularly opportune. Hitherto, although many supply undertakings have adopted them in their own work and recommended their use, they have too often been regarded merely as a desirable ideal instead of as a working guide to sound installation practice.

Only the West Ham Corporation has been empowered to enforce bylaws to protect its consumers from risks of fire and shock, and Mr. F. W. Purse, the chairman of the present I.E.E. Committee, who was then borough electrical engineer, adopted the I.E.E. Rules in their entirety.

Added weight is now given to their authority by the official recognition accorded them by the Electricity Commissioners in the Electricity Supply Regulations, 1934, which state that compliance with the I.E.E. Rules fulfils many of the legal requirements for ensuring the safety of the public. As all existing installations must be in accordance with the Commissioners' Regulations by the beginning of next year, it is most desirable that the I.E.E. Rules should represent the considered and up-to-date views of the industry.

The previous edition was published five and a half years ago, and, in view of the advances in technique made since then, the wider conditions of use, and the crystallisation of views regarding several salient aspects, a new edition was, in any case, called for.

The alterations of widest interest are those relating to earthing, and we leave Mr. T. C. Gilbert to deal with this on another page. We especially commend the attention given to the conditions of installation of apparatus in the bathroom in particular, and under domestic conditions in general. It is there that the I.E.E. Rules find the greatest scope, for, although they are equally applicable to factories, mines, theatres and cinemas, the use of electricity in such places is covered by official regulations having the force of law. The householder not being subject to legal restrictions in the same way is without such protection, and he has to rely upon his contractor being willing and able to work to the reasonably high standard set by the I.E.E. Rules.

The make-up of the tenth edition differs from that of its predecessor in many ways. Installation has been separated from design, and the confinement of each section to a group number (100, 200, &c.) should facilitate reference and make a more flexible arrangement, as new paragraphs can be added without having to renumber the sections. The tables included at the end of the volume have been extended by the inclusion (as a result of investigations of the Electrical Research Association) of data regarding the use of cables for a.c. supplies enclosed in conduit or steel armouring. Incidentally, we are glad to notice that space has been saved in the text by references to appropriate British Standard Specifications.

We believe that the new edition of the Wiring Rules will meet the views of the large majority of electrical engineers. The members of the Committee have represented all sections of the industry in more than a formal sense.

The Brighton Extension

The new 30,000-kW extension at Southwick power-station (costing less than £10 per kW), which was started up earlier in the week, forms part of a scheme that will shortly bring the capacity up to 100,000 kW. The last extension took place about three years ago, when a 15,000-kW unit was installed in quick time to meet load developments in Brighton. The importance of the station lies in its being the only one selected for operation on the coast of the South-Eastern area of the grid. Its thermal efficiency of 20.78 per cent. last year (1.32 lb. of coal) was good for the size of plant installed, but improvement may be expected owing to the new set taking the base load. Particular attention has been given to flue-gas washing, and the results obtained from the plant designed by Mr. W. N. C. Clinch, the borough electrical engineer, will be awaited with

interest. As a commentary on the saving of space with large-capacity modern plant, and incidentally on the foresight shown in laying down the station thirty years ago, the engine room will hold plant of eighteen times the capacity of the original installation.

High-power Radio

WHEN the 5XX transmitter was started up in an experimental way at Chelmsford nine years ago it was considered a very potent factor in the youthful broadcasting service. Since that date great advances have been made both in England and abroad, and 5XX found itself quite a minor voice in the new concert of Europe. One by one foreign broadcasting concerns put higher and higher powers into their aerials, albeit some of the ratings were open to question, until finally Moscow topped the lot with 500 kW. In the meantime the British Broadcasting Corporation had opened new stations with what are now quite moderate ratings, although several times above that of the original 5XX transmitter. Now, with the opening of the Droitwich station, which is described in this issue, England steps once more into the front rank. The new station will ultimately supersede three National transmitters, as its programmes will reach practically the whole of the population. There are many unusual features in the equipment, which make it of considerable technical as well as popular interest.

Fair Prospects

AN encouraging statement was issued last week by the organisers of the British Industries Fair, from which it is clear that the Electrical Section at Birmingham next year will be larger and more comprehensive than ever. Already, nine months in advance of the opening date, more space has been booked by electrical exhibitors than was occupied by the whole section at this year's Fair, and these include thirty newcomers. In the absence of a purely electrical exhibition the British Industries Fair provides the best annual opportunity to British electrical manufacturers to show the buying public what they can do, and the continued growth of the Electrical Section is a sign of vigorous health.

The Brazilian Market

A BRAZILIAN Government publication dealing with the country's resources and trade is not too encouraging from the electrical point of view. Electricity seems to be making but slow progress, and in spite of the tremendous field available imports of electrical equipment are shown to have declined in 1932. Great Britain's share in the electrical import trade is fairly satisfactory, especially as regards cables and motors, but there is still ample room for improvement. A country which is as rich in natural resources as Brazil cannot fail to be of great importance in future, and the Brazilian market is one on which British traders should keep a close watch. Any improvement in the country's economic conditions is likely to lead to considerably increased import business. That British concerns can hold their own in Brazil is demonstrated by the success of Metropolitan-Vickers in securing the contract for the electrification of the Central Brazilian Railway.

Body Heat

THE heat produced by human beings from chemical changes associated with living processes, circulation, respiration, and glandular activity can contribute materially to the temperature of a room. In a B.A. paper on the use of bright metallic surfaces for increasing human comfort in the tropics, Mr. G. P. Crowden gave the total heat generated by a clothed sedentary person at 400 B.th.u. per hour, and the proportion lost by radiation in still air, at 60 deg. F. and 50 per cent. humidity, at 45 per cent. This makes the net heat gain to the atmosphere somewhat lower than that generally assumed from approximate calculations. At 80 deg. the B.th.u. radiated is approximately half. To remove this radiated heat quickly from the body is one of the most important functions of the small fan, as we pointed out in our leader of July 27th. Far greater use should be made of this piece of apparatus than is the present custom.

In America, Too!

MANY a time we have questioned the propriety of municipal authorities making large profits on their electricity undertakings for the purpose of relieving the general rates, and now we find that in the United States the same problem has arisen. The New York Public Service Commission, as a result of complaints by electricity consumers, has made a ruling that it should be the aim of municipal undertakings to operate at as close a margin of profit as possible. To obtain excessive profits for the purpose of transferring them to the general fund for tax reduction, or the promotion of other municipal projects, is "indirect and unfair taxation of consumers."

Potential Loads

A DECLINE in output that is accompanied by a pronounced increase in the connected load is likely to present difficulties when the total h.p. is once more actively employed. In the main area of the Government supply in the Federated Malay States Mr. W. J. Williams, Director of the Electrical Department, shows in his annual report, the kW connected has increased by over 40 per cent. in three years, in spite of which the kW generated has fallen by about 18½ per cent. in the same period. This is an extreme case, and the generating plant now installed appears adequate to meet a demand that is in more reasonable proportion to the undertaking's liability to its consumers, but there is a lesson in this to undertakings not so far afield. Even though a grid supply may help to cope with the demand at the central point of supply, there are also the effects of perhaps suddenly increased loads on feeders and sub-stations to be considered.

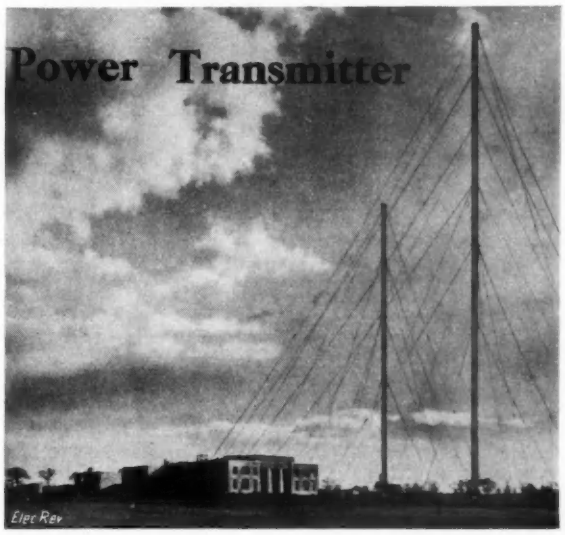
Architectural Lighting

THE Lighting Service Bureau keeps well abreast of modern developments. It was only two years ago that we described the alterations made when the accommodation was increased by some 50 per cent. The most notable feature of the present reconstruction scheme is the emphasis laid on the possibilities of architectural lighting. While some of the designs in decorative lighting are radically different from those in vogue only a few years ago, there is nothing freakish about them. They are representative only of types that meet modern needs, and here architects have shown more courage in some cases than we have. While the aim of the Bureau is to assist members of our own industry, it also provides a means of showing the general public, and prospective customers in particular, how things should be done.

The Exhibition Season

EXHIBITIONS tend more strongly each year to become working models of some of the applications of electricity. Thus the Chocolate and Confectionery Exhibition, held every September, can always be relied upon to provide attractive examples of display lighting as well as of the increasing number of designs of machinery in which an electric motor is incorporated instead of leaving the question of the motive agent an open one. The integral drive is also increasing noticeably at the Bakers' and Confectioners' Exhibition now running at the Agricultural Hall, Islington, but there the most striking electric demonstration is its rise for baking and ancillary purposes. In the Building Exhibition which opened at Olympia on Wednesday, electrical interest gravitates to the domestic apparatus which many of our leading manufacturers display, but the all-electric machinery shown should not be overlooked.

The Droitwich High Power Transmitter



IN design as well as plant layout the Droitwich high-power transmitter, which was officially inaugurated on September 6th, differs materially in several respects from any of the stations which the British Broadcasting Corporation has so far constructed.

It is situated due west of Daventry, which it will presently displace, using the 5XX long wave for the National programme and the 5GB medium wave for the Midland Regional programme. All the power plant for the latter has been completed, but the transmitting gear is not yet installed.

The new 5GB plant will be of similar design and power (50 kW) to the other Regional transmitters, but the new 5XX transmitter will use 150 instead of 30 kW and provide rather more than twice the signal strength of the old station which has served for nine years. The lower attenuation of the long wave will minimise fading and night distortion, and quality will be improved by the special measures that have been taken to render the transmitter fully responsive to the higher frequencies.

Since the new 5XX plant is intended to serve the whole of the British Isles, it will be possible ultimately to close down the National (Daventry relay) transmitters at Washford Cross in the west, Moorside Edge in the north, and Brookmans Park in the south-east (London area). Thus there will ultimately be one high-power long-wave National-programme transmitter and several medium-power medium-wave Regional-programme local stations.

Special Features

The new 5XX plant differs from previous B.B.C. practice chiefly in the following respects. The power house generates a.c. instead of d.c. Series modulation has been employed for the long-wave transmitter, with extra large valves of a new replaceable type cooled by both air jets and water circulation. The high voltages for the anodes are provided by steel tank mercury-vapour rectifiers instead of motor generators, and motor generators are used to the exclusion of batteries.

The switchgear is all operated automatically from the control table in the transmitter hall, round which is the control gallery through the floor of which the transmitter units project upward from the floor below, all the machines being at ground level.

Sufficient fuel-oil storage for three months' operation is provided outside the buildings, where are also the water coolers for the valves and engines, the circulating systems being closed, with external cascade spray cooling. The power house contains four 750-b.h.p. six-cylinder Diesel oil engines, each coupled direct to a 470-kW, three-phase, 50-cycle, 415-V, 375-r.p.m. alternator. The total capacity is 1,880 kW and three sets running at three-quarter load suffice for providing the 1,000 kW needed for both transmitters when radiating at full power.

Besides such engine auxiliaries as fuel and water pumps, air compressors, &c., the power house also contains two a.c. to d.c. motor generators for charging a 1,500-Ah, 220-V battery, the function of which is to provide light and drive such small auxiliaries as are needed when the main engines are not running. All the wireless gear is "mains" driven. The power house switchgear is of standard pattern, and vibration has been minimised by mounting all four generating sets on a 900-ton concrete "island" floating on cork.

The design of the Droitwich station was somewhat complicated by the fact that the 150-kW long-wave transmitter (5XX) requires an anode supply of about 30 A at 20,000 V, while the corresponding requirement of the Midland Regional (5GB) is 15 A at 11,000 V.

For the 5XX anode supply two mercury-arc steel-tank rectifiers have been installed, one as a stand-by for the other, with the high-voltage transformer, pumps, and auxiliaries for each in its respective enclosure. The rating of each rectifier is 600 kW at 20,000 V d.c., which is a noteworthy performance. Grid control is provided for the suppression of arc-back and short-circuiting and the control gear, which stands on insulators within the protective enclosures, is arranged for remote operation over pilot wires to enable the monitor in the transmitter hall to raise the d.c. voltage from zero to 20,000 V.

For the 5GB anode supply two high-voltage motor-generators (maximum voltage 12,000) have been installed, one as a stand-by to the other. The switchgear for these machines is so arranged that the two generators can be run in series for the supply of high-voltage (20,000 V) to the long-wave transmitter, if required. The machine room also contains part of the smoothing circuit for both the motor-generator and the rectifier high-tension supplies and, at gallery level, switchgear controlling the input to the high-tension machines and rectifiers.

The machine room, showing one mercury-arc rectifier enclosure, power switchboard and part of motor-generator

The Transmitter Hall

The transmitter hall is quite unlike that of any other B.B.C. station, as at ground level it houses all but two of the motor-generators for the two transmitters. The filament-current machines for the long-wave transmitter are each mounted immediately adjacent to the particular unit or valve which it is supplying.

Of particular interest are two machines, one as a stand-by to the other, which supply filament current for the "B" unit of the long-wave transmitter. They are installed in a safety enclosure and are entirely insulated from earth, because the filaments of the valves which they supply are 10,000 V above earth, rising to as much as 20,000 V during full modulation. The induction motors driving these machines are at earth potential and power is transmitted through porcelain couplings. The various controls, such as field current regulators, are similarly insulated.

Among the machines on the ground floor is a unit which has been called a "transducer." This device is an innovation, being situated in the circuit between the output of the transmitter and the feeder lines to the aerial-transformer house. It contains high-frequency circuits, the main function of which is to reduce attenuation of the higher audio frequency sidebands, thus enabling the long-wave transmitter to have a straight-line frequency response up to approximately 9,000 cycles per second.

On the other side of the transmitter hall are situated the filament-current generators, grid-bias generators, and h.t. generators. All motors driving the various generators are of the induction type, but the larger motors driving the high-tension generators are self-starting synchronous motors. The principle of grouping all the smaller motor-generators on ground level in the transmitter hall enables them to be conveniently watched by the engineers on duty at the transmitter control table. At one end, also at ground level, is a large switchboard on which are mounted the contactors of the automatic switchgear for the control of the motor-generators.

The gallery of the transmitter hall, as explained earlier, will contain the two transmitters on opposite sides, facing each other.

The long-wave transmitter consists of five units, as follows: Unit "A" is purely a three-stage low-frequency power amplifier, or modulation unit. Its final stage consists of four 10-kW water-cooled valves connected in parallel and working with 10,000 V on the anodes. Standby valves for each stage are provided, and can be brought into circuit immediately by the operation of their respective change-over switches.

Unit "B," the second, is a two-stage high-frequency power amplifier, driven by a constant-frequency drive situated elsewhere in the building. Its final stage consists of four 15-kW water-cooled power transmitting valves, also running with 10,000 V on their anodes. The usual arrangements are provided for switching in spare valves without the necessity of handling the valves themselves.

New Modulation System

The new Marconi system of series modulation has been incorporated in the design of this transmitter. The final stages of units A and B are connected in series so that the final stage of unit A acts as a speech-controlled resistance in series with the anode supply to unit B, the total voltage across both stages being approximately 20,000. Thus, in the condition of no modulation each will have a potential of approximately 10,000 V across it.

Units "C.1" and "C.2," the third and fifth, are the two halves of the final push-pull modulated-high-frequency stage. Each of these units contains three water-cooled transmitting valves of a new type. They are each capable of a maximum output of 50 kW, one valve in each unit acting as a spare. With two 50-kW valves each side of the push-pull circuit, therefore, an output power of 150 kW is obtainable without running the valves at their full load rating. Owing to their weight and physical size a special trolley arrangement has been provided for wheeling the valves into position with a jack to lift them on to their seatings.

Unit "D" contains the tuning circuits for units "C.1" and "C.2," which are situated symmetrically on either side of it. On this unit are also placed various meters showing peak modulation, power output to the feeder lines, &c. The output passes through the "transducer" and thence to the transmission lines connecting the main station building to the aerial-transformer house. To prevent danger to life, the doors of these units cannot be opened until the high-voltage supply has been cut off.

The power control table is situated at one end of the hall facing the two transmitters. On this are mounted the essential controls for both transmitters, together with meters reproducing the readings of the most important meters in the transmitter units. Two engineers will sit at this control table, one monitoring the National transmitter and the other the Midland Regional transmitter. The actual control handles regulate the various power supplies through the medium of the automatic switchgear. Interlock circuits make it impossible accidentally to connect two machines to the same load or to make serious mistakes in switching operations.

Immediately behind the power control desk is a switchboard with e.h.v. electrostatic voltmeters and thermal ammeters indicating the outputs of the various machines, as well as manual controls for hand operation in the event of failure of any of the automatic switchgear.

The T-aerial is supported by two 700-ft. masts, which are 200 ft. taller than any of the other B.B.C. masts. One only will suffice for supporting the 5GB medium wave Regional type of aerial. The aerial transformer house is situated between the masts at the foot of the vertical down-lead, and contains duplicate aerial tuning circuits. This principle has been adopted for the first time owing to the possibility of damage by a lightning flash which may not be cleared by the arrestors.

The lattice steel masts are of triangular section, and each contains an electric lift with overhung winding gear. Aircraft warning lights are provided for each mast, at the top, middle, and bottom, fed through block filter circuits which prevent the radio-frequency currents passing to earth through the lighting cable. At the base are air-break switch links for earthing the mast, supplying power to the lift motor, and connecting the mast head telephone.

The accommodation includes a quality checking room, oscillograph room, a studio for testing purposes and emergency use, stores, workshops, an office block, and staff quarters, including a mess room and kitchen. The buildings are heated by means of an engine exhaust-gas boiler with an oil-fired boiler for use when the main engines are not running.

The Principal Contractors

The technical equipment was supplied by the following manufacturers:—

Rectifiers, switchboards and mast lighting cubicles, British Thomson-Houston Co., Ltd.; high-tension motor-generators, Diesel engines, alternators and switchboards, English Electric Co., Ltd.; transmitter and aerial, Marconi's Wireless Telegraph Co., Ltd.; motor-generators, switchboards and lighting fittings, General Electric Co., Ltd.; power cables and light wiring, Drake & Gorham, Ltd.; cables and condensers, British Insulated Cables, Ltd.; condensers, Telegraph Condenser Co., Ltd.; resistances, Cressall Manufacturing Co.; iron-cored inductances, Johnson & Phillips, Ltd.; storage batteries, Alton Battery Co., Ltd.; intercommunicating telephones, Reliance Telephone Co., Ltd.; electric clocks, Magneta Time Co., Ltd.; lighting fittings, Fredk. Thomas & Co., Ltd., and Troughton & Young, Ltd.; water meters, Electroflo Meters Co., Ltd.; aerial lead-in pylon and outdoor switchgear, Standard Switchgear, Ltd.; lightning protection, J. W. Gray & Son, Ltd.; switchgear, Brookhirst Switchgear, Ltd.; fuel tanks, Whessoe Foundry and Engineering Co., Ltd.; engine cooling plant, Ledward & Beckett, Ltd.; masts, Radio Communication Co., Ltd.; water heaters, Nathan & Allen, Ltd.; cranes, Herbert Morris, Ltd.

Electricity in the Federated Malay States

IN his annual report for 1933, Mr. W. J. Williams, Director, Electrical Department, F.M.S., states that towards the end of the year there were distinct signs of an upward tendency in the consumption of electricity by private as well as Government undertakings.

The total kWh generated for the Kuala Lumpur district (supplied from the Bungsar and Ulu Lungat stations) was 20,694,000—an increase of 4.75 per cent. over the 1932 output, but the latter showed a drop of 12.7 per cent. from 1931. The highest output was in 1930 when 25,279,000 kWh was generated. Nevertheless the kW connected rose from 12,968 in 1930 to 18,280 in 1933, a condition that is typical of all the Government undertakings.

In addition to the effects of trade depression, the introduction of daylight saving has been materially adverse to the output. The m.d. on the 19,000-kW Bungsar steam station was 4,600 kW, the load factor 25.3 per cent., and the overall thermal efficiency 10.6 per cent. The output to feeders was 8,450,000 kWh.

Two water-power stations at Ulu Lungat were purchased from the Sungei Besi Mines on April 1st for £200,000, the mines to receive up to four million kWh per annum free of cost for twenty years. Before that date the Government purchased 1,495,000 kWh from the Mines Co.; during the last nine months the output of these stations was 8,893,000 kWh of which 1,518,000 was supplied to the mines. Each station contains one 1,430-kVA set and transmits energy at 33 kV. They deal with a demand of 2,500 kW at a load factor of 52.5 per cent.

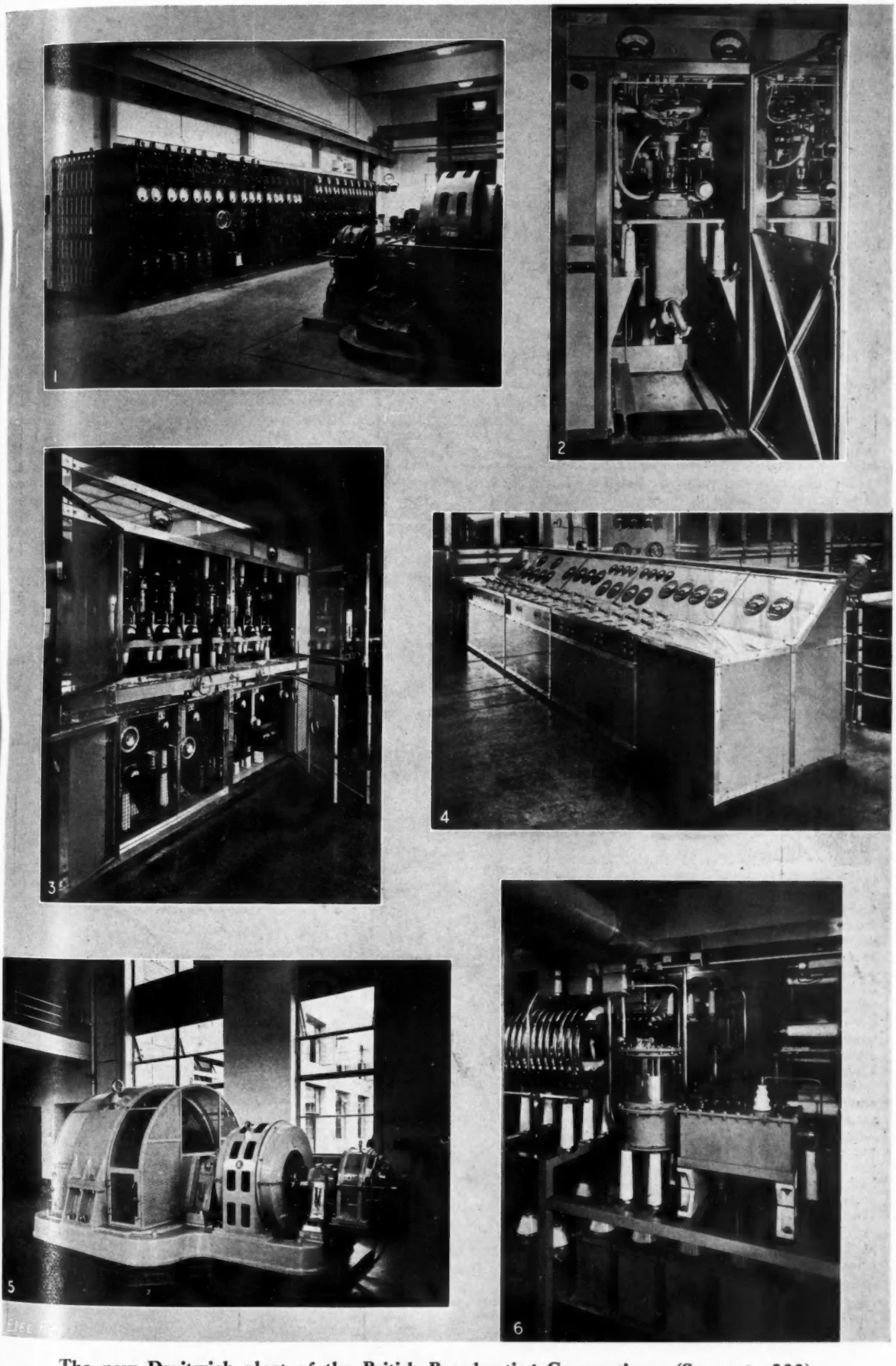
A large number of 33-kV pin and post-type insulators failed; they are being experimentally protected from high temperature variations by "Sunorain" topees.

The number of consumers connected at the end of the year was 6,529, a decrease of 5.2 per cent., although 337 new connections were made. For industrial power the sales amounted to 9,790,000 kWh, an increase of 16.6 per cent. over 1932, the h.p. connected being 13,137. Owing to the trade depression a large amount of electrical apparatus was returned, especially table and ceiling fans. There are 332 cookers in use, 316 geysers, and 1,173 fans.

Eight isolated areas are served by internal-combustion plants with an aggregate capacity of 3,400 kW, which generated 3,137,000 kWh. Five undertakings received bulk supplies totalling 2,519,000 kWh.

The gross revenue from all sources in 1933 amounted to $1,811,000 and the total working expenditure to $1,047,000. After paying interest, sinking fund and other standing charges there was a net deficit of $47,000.

There were 144 other generating stations containing 127,222 kW of plant subject to the Electricity Enactment with an output (for plants exceeding 100 kW installed) of 141 million kWh, of which 55 million was used for tin mining. Of the total, 96 million was produced from water, 27 million from steam, 18 million from oil and the rest from gas.



The new Droitwich plant of the British Broadcasting Corporation. **(See page 333)**

1. The power house, showing the switchboard and one of the generators. 2. One of the valves in a "C" unit of the National transmitter. 3. Front of the "B" unit. 4. Transmitter power control table. 5. One of the 12,000-V motor-generators. 6. An inside view of the "D" unit

EXTENSIONS AT BRIGHTON

WITH the official inauguration of the 30,000-kW extension last Monday, the total capacity of Southwick power station becomes 73,000 kW, which is to be increased shortly to 100,000 kW.

The 30,000-kW turbine is of the two-cylinder reaction type running at 3,000 r.p.m. with stop valve steam conditions of 650 lb. per sq. in. and 850 deg. F., and it weighs 310 tons. Four-stage feed heating raises the temperature of the condensate to 340 deg. F. The inverted type condenser, which has an effective cooling surface of 28,000 sq. ft., is fitted with an 8 in. relief valve. An auxiliary oil pump floats the shaft on oil at 1,000 lb. per sq. in., while the motor-operated turning gear is in action at starting. An evaporator utilising bled steam is used for evaporating make-up feed water. The usual atmospheric exhaust valve is replaced by equipment for shutting down the set if the vacuum falls below a predetermined figure. One c.w. pump (28,000 gal. per min.) driven by an a.c. motor (the existing c.w. pumps are d.c. operated) has been installed.

The 37,500-kVA (m.c.r.) alternator generates at 8 kV. Cooling is by two fans and an air cooler through which circulating water is passed, the airways being incorporated in the foundations. It is connected to the bus-bars by twelve cables and controlled by an oil-switch with a rupturing capacity of 750,000 kVA.

On the turbine instrument panel are mounted a diagram of the steam and water connections and steam and condensate gauges. Push buttons are arranged on the diagram at points where temperatures of steam and water are designed to be obtained and the figures are shown on an indicator.

For interconnecting the new 675 lb. steam range with the older system working at 350 lb. per sq. in. a Richardsons-Westgarth 6,000-kW back-pressure single-cylinder three-stage impulse turbine, driving a 7,500-kVA Brown-Boveri alternator, has been substituted for an existing set of the same capacity. This turbine at full load passes 390,000 lb. of steam per hr. When out of commission it is by-passed by a reducing valve.

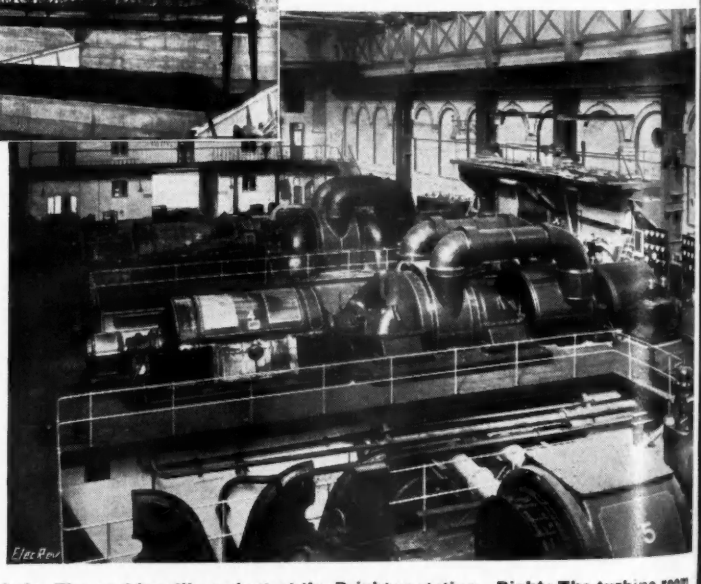
The Steam-raising Plant

The three new boilers have each an output of 150,000 lb. per hr. (normal), or 180,000 lb. (m.c.r.) at 675 lb. per sq. in. and 875 deg. F., a tube heating surface of 13,459 sq. ft., and a weight of 1,100 tons. The drums, forged in one piece from ingots, have an internal diameter of 42 in. and length of 29 ft. 6 in. The convection superheater for raising the steam temperature from 510 to 800 deg. F., situated between the front and second banks of tubes, has a heating surface of 4,422 sq. ft.

A Stirling radiant superheater, the tube surface of which is covered with Bailey blocks, forms part of the side walls of the combustion chamber and has an effective area of 200 sq. ft. Foster gilled-tube economisers (12,312 sq. ft.) and two Ljungstrom heaters (9,450 sq. ft.) for raising the temperature of the air for combustion to 345 deg. F. are installed for each boiler. The i.d. fans are fitted with inlet scrolls to catch grit before the gas passes through the fan runner; the f.d. fans, which like the i.d. fans are driven by two-speed motors, handle 34,000 cu. ft. of gas per min. From the i.d. fans the gases are washed before going to the steel "Gunite"-lined chimneys. The latter are 200 ft. above the boiler-house floor.

The coal bunkers, subdivided to enable a mixture of fuel to be used on each boiler, have a capacity of 520 tons. The coal goes, *via* automatic 5-cwt. weighers and non-segregating chutes, to Taylor stokers or to traversing chutes for the chain-grate stoker.

Two boilers are equipped with Taylor stokers, thirteen retorts, 18 ft. long, into which coal is fed by variable-speed rams, and ash crushing gear is arranged at the rear. The third boiler is fitted with an "Usco L-type" travelling grate stoker, 24 ft. wide by 18 ft. long. The walls of the combustion chambers (8,460 and 8,750 cu. ft.) incorporate boiler tubes and Bailey blocks instead of brickwork where the temperature is too high for firebricks to have a long life.



Left: The coal-handling plant at the Brighton station. Right: The turbine room with the new 30,000-kW set in the foreground

In addition to the instrument panel on the firing floor, there is a summation panel in the control room indicating the loads in the boilers and temperatures. The existing coal-handling plant has been augmented by a 3¼-ton portal type crane capable of grabbing 60 tons per hr. The old telpher system has been converted to a travelling bridge, which discharges the coal to a hopper working in conjunction with a 400-ft. (double) belt with a speed of 200 ft. per min. and a capacity of 120 tons per hr. After passing a crusher with jigger feeder the coal is conveyed by belt elevator to a chain bucket elevator, from the top of which it is discharged to a distributing belt con-

veyor over the bunkers. Works power required for the new plant is obtained at 400 V from two 1,500-kVA transformers.

The Inauguration Ceremony

The inauguration proceedings took place on Monday. The Mayor of Brighton, Councillor Miss Margaret Hardy, began the ceremony at the station, where at the request of Alderman S. C. Thompson, chairman of the Electricity Committee, the Mayor started the machinery, and, after the company had been shown round the works, they returned to the Royal Pavilion for lunch, which was presided over by Alderman Thompson. Mr. F. G. H. Bedford, managing director of Messrs. C. A. Parsons & Co., Ltd., proposed the toast of "The Brighton Corporation and its Electrical Supply." He said that Brighton had 2¼ million pounds invested in its undertaking. During the last five years the consumption had increased from 36 million kWh to 100 millions; the number of consumers was now 35,000. He paid a tribute to the engineer and manager, Mr. W. N. C. Clinch and his staff. In responding the Mayor said that the Corporation was endeavouring to improve the conditions of life for the smaller classes of householders and to increase their leisure.

Alderman Thompson, proposing the toast of "The Visitors," referred to the continued efforts of Alderman Sir Herbert Carden to promote the success of the station, and paid a tribute to the work of Mr. G. Claughton, the station superintendent. Mr. Frank Hodges (Central Electricity Board) replied. Mr. Clinch proposed the health of the contractors and Mr. G. Summers, director of the Stirling Boiler Co., Ltd., responded.

The contractors engaged in the extension of the station were as follows:—

Foundations, Bierrum & Partners, West's Rotinoff Piling & Construction Co., Ltd., Indented Bar & Concrete Engineering Co., Ltd.; buildings, Dorman Long & Co., Ltd. (steel), W. H. Heywood & Co., Ltd. (glazing); ash-handling, Ash Co., Ltd.; weighing, W. & T. Avery, Ltd.; back-pressure turbine, Richardsons, Westgarth-Brown Boveri, Ltd.; boilers, Stirling Boiler Co., Ltd. (drums, English Steel Corporation); lift, Penrose Lifts, Ltd.; water regulators, Cope's Regulators, Ltd.; c.w. piping, Aiton & Co., Ltd.; conveyors, Herbert Morris, Ltd.; cooling crane, Clarke, Chapman & Co., Ltd.; evaporator, P. & B. Evaporators, Ltd.; feed and circulating pumps, Mather & Platt, Ltd.; economisers, Eco Power Co., Ltd., Green & Co., Ltd.; h.p. valves, Dewrance & Co., Ltd.; h.t. cables, Siemens Bros., Ltd.; fan motors, Laurence, Scott & Electromotors, Ltd.; instruments, Geo. Kent, Ltd., Allen West & Co., Ltd.; lagging, Cape Asbestos Co., Ltd.; air heaters and fans, James Howden & Co., Ltd.; painting, S. & F. Contracting Co., Ltd.; metal sheeting, Cellactite & British Uralite, Ltd.; recording instruments, A. E. G. Electric Co., Ltd.; retort stokers, Taylor Stoker Co., Ltd.; steam drain valves and traps, Hopkinsons, Ltd.; steam and feed piping, Babcock & Wilcox, Ltd.; steam-turbo feed pump, G. & J. Weir, Ltd.; switchgear, Metropolitan-Vickers Electrical Co., Ltd. (works power, Geo. Ellison, Ltd.); travelling telpher coal bridge, Fraser & Chalmers Engineering Works; transformers, British Electric Transformer Co., Ltd.; turbo-alternator, C. A. Parsons & Co., Ltd.; "Usco" stoker, International Combustion, Ltd.

The extension was carried out to the design and under the supervision of Mr. W. N. C. Clinch.

Earthing Requirements. By T. C. Gilbert, A.M.I.E.E.

Important points in the new I.E.E. Regulations

THE issue of a new edition of the I.E.E. Wiring Regulations is, of course, an electrical event of the year, and the Tenth Edition is full of material for discussion in technical circles. As to whether new or revised provisions represent steps forward or backward must be left in most cases for the individual's decision, but it will be generally agreed that the revised requirements for protection by earthing are decidedly in advance of anything previously attempted.

The reader of the new edition is confronted as early on as the Definitions with radical alterations in the paragraphs dealing with earthing. If as familiar as he should be with the last edition he will at once notice the absence of old Definition 12 ("Earthed; the expression 'earthed' means connected to the general mass of the earth in such a manner as will ensure at all times an immediate discharge of electrical energy without danger"), which has gone, with all its impossible pretensions, to the limbo of outworn things. Definition 12 always managed to provide an air of insincerity to the old earthing requirements, and few will mourn its passing.

[Elliott & Fry
Mr. T. C. Gilbert

In its place we find a brand-new definition, which states: "Earth. A connection to the general mass of the earth by means of an earth electrode; an object is said to be earthed when it is electrically connected to an earth electrode, and a conductor is said to be solidly earthed when it is connected to earth without a fuse-link, switch, circuit-breaker, resistor, or impedance, in the earth connection." A later definition states: "An earth electrode may be a metal plate, water pipe, or other conductor, which is electrically connected to the general mass of earth in such a manner as to comply with these Regulations."

Before turning to Section 10—Earthing, in order to ascertain these new requirements, there is another newcomer amongst the definitions that merits attention, and rather forecasts what some of the revised provisions will demand. It defines resistance area as "the area of ground (round an earth electrode) within which a measurable voltage gradient exists when the electrode is being tested." A note to this definition says that beyond the resistance area the voltage gradient is too small to be measured, but points out the importance of ensuring that during testing the resistance areas of the electrodes do not overlap. (See Regulation 1110.)

No previous edition of the Regulations has ever concerned itself with anything beyond the earth connection of the interior installation, but this edition is very clear and concise, and provides no loophole for the inadequate earth. Just how effective earthing is to be secured is set out in Section 10, p. 73, covering Regulations 1101 to 1008, eight very important and far-reaching paragraphs of clear wording and—more important still—clear thinking.

In the Bathroom

Nothing of particular note appears in the first, which simply defines those things that are to be earthed, except that in a note the use of two-pin reversible plugs is deprecated, and the use of insulated portable appliances, such as toasters and hair-dryers, is recommended. Regulation 1002 commences the real business. In this we find that in all rooms containing a fixed bath (Clause A) all metal forming part of the electrical equipment must either be completely shielded by insulating material, or, alternatively, concealed within walls, floors or ceilings. Under the previous Regulation all these things will have been earthed, but it is clear that reliance is not now to be placed upon this alone to protect the user of the room against possible leakage potentials upon the metalwork. Personally, I should like to have seen this requirement extended to all rooms containing fixed wash-basins (hair-dressing saloons, for instance) as apparently this requirement is made irrespective of the use of portable apparatus.

Regulation 1002 B takes matters a step further, as if the concealment or insulation of metalwork is not practicable then a special bonding bar must be installed, consisting of either a tinned copper strip, 0.5 in. by 0.02 in., or a stranded tinned copper conductor of not less than 7/.036 (presumably bare, but protected from mechanical damage and corrosion) in all rooms containing a fixed bath. To this conductor *all* exposed metalwork in the room is to be permanently and rigidly connected, whether electrical metal or not, including all piping and the bath itself, if of metal. If wall sockets are installed in this room, then the earth terminals of such sockets must also be connected to the bonding conductor, which is designed to maintain uniform potential upon all exposed metalwork in the room. Conduits, &c., and the earth sockets of plugs will have been earthed under a previous regulation, but it is not definitely stated in this particular clause if the bonding bar is to be separately earthed in addition. A later Regulation (1006), however, makes this clearer.

Treatment of Gas Pipes

This Regulation demands the connection of a gas geyser, if in use, to the bonding bar, and the gas pipes must therefore form part of the earth circuit. This is, in fact, referred to in Regulation 1006 B, which states that pipes conveying gas or an inflammable liquid shall not be used as an earth or as an earth continuity conductor, but when they are connected to electrical metalwork in compliance with Regulation 1002 B then an earth and an earth continuity conductor distinct from such pipes shall be provided for the electrical installation.

It will be noted that the interconnection of gas pipes and electrical gear is only required in rooms containing a fixed bath, in all other situations the command to keep conduits, &c., clear of gas and other pipes still runs (406 A and 408 C). It would appear that the requirement to bond conduits or lead sheaths to gas pipes might with advantage be extended to certain other situations.

The note to this Regulation (1002 B) is still more revolutionary, and commences by stating that the use of, or the provision for the use of, portable appliances in any room containing a fixed bath is not recommended. Where such appliances are installed, however, special attention should be paid to the note to Regulation 1001 (deprecation of two-pin plugs and recommendation of all-insulated apparatus), but if they are not of the all-insulated type then it is recommended that the final sub-circuits shall be protected by automatic leakage-trip devices set to operate on a leakage current not exceeding 30 mA.

Should Leakage Trips be Compulsory?

No mention is made of earth resistance, irrespective of which final sub-circuits should be protected by means of earth-leakage switches, and one can only regret that this is a recommendation and not a specific requirement. I am of the opinion that the compulsory use of leakage trips in all rooms containing a fixed bath (and elsewhere) would obviate the necessity for the expensive and complicated bonding of all exposed metalwork.

The remaining clauses of this Regulation are notable in one respect only: a doubtful point is cleared up in the definite requirement for even all-insulated switches, &c., to be placed out of reach of a person seated in a bath. But Regulation 1005 administers the big shock. The first clause requires that great care shall be taken to ensure as far as possible that the combined resistance of the earthing continuity conductor (which may consist of metal sheathings or conduits), the earthing lead, and the earth itself is low enough to permit the passage of the current necessary to operate the cut-out or the overload trip of the circuit-breaker protecting the circuit. Then follow two very important requirements, one affecting the resistance of the earth itself and the other the resistance of the earth continuity conductor, lead sheaths, conduits, or whatever may provide this conductor.

The first of these is of outstanding importance, in that for the first time the actual resistance of the earth electrode is dealt with in a definite manner, previous editions having been content to specify a limit to the resistance of the internal conduits, &c., but none to the external earth to which they are connected. In Regulation 1005 C, however, we find that either the earth lead shall be connected to an earth the resistance of which (when measured as specified in Regulation 1110) does not exceed *one ohm*, or where it is *economically* impracticable to obtain an earth having a resistance of not more than one ohm, then earthing shall be supplemented by an earth-leakage trip so adjusted that it will operate at not more than 30 mA. This requirement is compulsory and will bring within its scope practically all rural installations in which the earth connection cannot be made to public water supplies.

A Question of Precedence

This Regulation may require a little elucidation, as already a minor controversy has arisen as to the exact meaning of the words "shall be supplemented by" earth-leakage trips. It has been expounded to me at length that the framers of the Regulation intend that the leakage trip shall only be used as a second line of defence, as it were, the real reliance being placed upon the "solid" earth and the leakage trip connected in parallel, to take up duty if for any reason, such as the appearance of resistance or even complete loss of continuity, the main earth ceases to function efficiently. I cannot agree that this was really intended, although it is certainly possible to install and operate earth-leakage trips on these lines, and the method has been advocated by some engineers at various times.

If such a system of installation be adopted, however, the leakage-trip form of protection losses some of its valuable features. For instance, with normal installation (the trip coil being inserted at some suitable point in the earth continuity conductor), it is possible to test earthing continuity to each and every point easily and quickly by the simple expedient of shorting the phase line, socket, element, or what not to the nearest earth terminal; this results in the harmless tripping of the switch without the complication of blown fuses or the appearance of heavy currents, with consequent high potentials, upon the earth electrode, the earth continuity conductor, and all connected apparatus.

In addition, it becomes necessary to use two earth electrodes with the parallel method of installation, as the connection of the "solid" earthing lead and the other—I will not say "artificial" as this ugly word is not used anywhere throughout the Regulations—earthing lead to the same electrode may result in the practical shorting-out of the trip coil in certain circumstances, and no apparatus can work under these conditions. With two electrodes heavy cost may still be incurred with the main earth, if this is to be the first line of defence, although the trip earth may be small, inefficient and almost perfunctory.

For these and other reasons I think that the intention is to install earth-leakage trips in the normal way, and that the words "shall be supplemented by" mean that when normal earthing is finally completed, and the earth resistance found to be above one ohm, then the earth continuity conductor shall be cut at some convenient point and protection supplemented by the connection of an earth-leakage trip. This would result in the maximum of protection, combined with ease of test, whilst no further electrode cost need be incurred, even if the resistance be as high as five hundred ohms.

Leaving this matter to be settled later—although it is clear to my mind—and proceeding to Regulation 1005 D, we find that the resistance of the earth continuity conductor (including metal conduits, metal sheathing of cables, armouring, and the earthing lead itself), measured from the connection to earth to any other position in the completed installation, must also not exceed one ohm. This need not cause serious inconvenience, however, as any well-constructed installation should easily comply with this requirement, and the old allowance of two ohms was rather in excess of actual need.

There may be some small difficulty in ensuring absolute compliance with the provision in a note that leakage potentials shall be limited to 50 volts, as the resistance of conduits and sheathings is not a very stable factor in our calculations, and other things may on occasion conspire to render our care ineffective. The watchword would appear to be "When in doubt fit earth-leakage trips," which, it will be noted, exempts one from any further liability under this point, and provides the only certain method of complying with the Regulation.

Protection of the Earthing Lead

Regulation 1006 has already been referred to, and calls for no further comment. The next, 1007, raises the very important point of protection for the earthing lead, both against damage and corrosion, but it is not, in my opinion, sufficiently explicit. For instance, may mechanical protection be provided by installing the earth lead in steel conduit? In view of Regulation 408 M, Section 4, presumably not, as it is clearly stated that in the case of alternating currents cables in conduits shall always be bunched, so that the outgoing and return cables are drawn into the same conduits.

Again, if earth-leakage trips are used, this impedance—even if it arose, which is impossible with very light currents—is unimportant and may be neglected, but it may be a very serious matter with solid earthing, when everything tending to limit the fault current and to increase the leakage potential upon conduits, &c., must be eliminated. If earthing leads require mechanical protection it appears that either non-metallic conduits must be installed or the special earthing leads now available utilised.

So far as I know, there is no apparatus immediately available on the market to enable compliance with the Regulation requiring earth-leakage trips. There are, of course, several ranges of gear already in common use in Germany and elsewhere, but it can hardly be suggested that we should have permanent recourse to imported switches in order to meet the requirements of British regulations. If some of our manufacturers can overcome their extraordinary detachment from current tendencies in electrical practice, it might be possible for us to procure British-made gear within a year or two.

Earth Electrode Resistance

Finally, turning to Section 11, dealing with the testing of completed installations, we find there the approved method of ascertaining the resistance of an earth electrode under Regulation 1110. This is the well-known three-electrode test, described very fully in Messrs. Evershed & Vignoles's useful booklet "Earth Resistance Measurement," and elsewhere; the Regulations recommend the use of one of the commercial forms of earth resistance measuring instrument in preference to the employment of ordinary instruments and calculations. The installation engineer must now add this special instrument to his equipment, and it may prove of even greater importance than his old friend the insulation resistance tester, being brought into play in all cases of doubtful earths. In by far the majority of cases, however, rural installations will be protected by means of leakage trips so that the trouble will not arise, and all instruments, tests, resistances and variations may be ignored.

We shall be the first English-speaking country to officially approve the use of earth-leakage protective systems utilising low-current trips, but there is little doubt that this lead will be followed elsewhere. In several countries authorities on the matter are sitting on the fence, but with our example before them there is reason to expect that they will come down on the right side. Caution and our national conservatism have at present got us to a sort of half-way house, but greater knowledge of, and experience with, the new method will ensure its wide extension beyond the limits mentioned in the Regulations.

A Year in an All-electric House. By Gwenda Burke

I RESIDE in a house of the modern semi-detached type—square hall, two entertaining rooms, large kitchenette, three bedrooms, and separate offices—and possibly the results obtained from twelve months' experience in using no other method of lighting, heating, or cooking than electrical will be welcomed by those who are still rather sceptical as to the cost, &c.

Every family, whether large or small, can economise in the consumption of energy by the intelligent use of electricity for all domestic uses. The ease with which we are now able to pass through the house, switching the lights "on" and "off," is a real pleasure after the endless groping for matches which had hitherto been our lot. To avoid the expense of undue wiring, a reliable make of 15/5-A adaptor has been used throughout.

Each room in the house contains one lighting point with single control, and a two-way switch operates the hall and stair lights. There is also a porch light. Each entertaining room is provided with a power plug for a radiator, and three other points. A suitable multiple-circuit plug is provided which can be attached to any of the points, thus allowing for the use of a standard lamp, table lamp, radiogram, electric clock and table appliances at the same time if necessary.

Each of the two principal bedrooms has a power plug for a radiator as well as a point to take a table lamp and electric kettle. The smaller bedroom has a 1-kW fire, and a plug for an electric alarm clock. The lighting unit is controlled by a two-way single cord ceiling switch.

In the kitchenette there are a three-pin socket for an electric washing machine or boiler; a cooker with an ironclad control unit embodying a subsidiary outlet for an electric kettle; and a small refrigerator with a double-pole switch. A 40-W lamp is fitted to a small bracket above the cooker.

The bathroom is provided with a plug to take a ceiling radiator, which is switched on and off by two cords. A 20-gall. water heater and an electric towel rail are also installed.

The occupants of this house number four persons (two adults and two children, aged fourteen years and ten years respectively) and the entire electrical equipment, including the items already mentioned, plus a coffee percolator, toaster, iron, vacuum cleaner, &c., is in almost daily use.

The electrical fittings are artistic, yet distribute the light evenly. British moulded glassware, tinted to tone with the general colour scheme of each apartment, is mounted in either oxidised-silver or chromium-plated supports, and suspended from the usual ceiling plates. Standard and table lamps, with delicate shades, are used to provide a soft, pleasing light.

An "Alton" inset fire (2 kW) is used in the lounge, and a 3-kW "glowing coal" type in the dining room. One bar of each fire gives sufficient heat for most occasions, while the other is always there to provide that little extra comfort which is so necessary on some winter evenings. Two bedrooms are equipped with 2-kW fires, finished in marbled design to tone with the general surroundings, while in the third bedroom we found that a 1-kW fire of the same type was ample. The 2-kW fires are fitted with a foot-press switch.

The heating of water for all domestic purposes is economically provided for by a cylindrical pressure-type 20-gall. unit, with a loading of 2,000 W. A thermometer and adjustable thermostat are provided. Since the heater has been installed it has not needed any attention whatever, yet the demands made upon it daily are somewhat heavy, and include the provision of water for several baths, the washing of all china and cooking utensils, cleaning, and the filling of the washing machine several times on one day of the week. The average cost per day for the luxury of an abundant supply of really hot water taken over a twelve months' period amounts to only 5½d.

The washing machine relieves me of all lifting of dolly-tubs, for after the washer is filled with hot water (a small hose-pipe is attached to the hot water tap for this purpose) a touch of the switch, and the clothes are "dollied" while I attend to the many other household duties. By touching another switch, the rubber rollers of a movable mangle revolve.

I have endeavoured to make my kitchen into a modern labour-saving workshop. The cooker, which is of medium size, has many interesting points and the following items have definitely proved that no other method of cooking is so eminently satisfactory:—Simplicity of cleaning all parts, including the oven; easy replacements—which, in my case, have not yet been necessary; no crevices in which grease may lodge; and efficient lagging.

Above: An example of even and adequate lighting. Left: An electrical breakfast table. Right: In the lounge—a Reyrolle service table in the foreground

The oven reaches a temperature of 400 deg. in 25 minutes, and the heat retention is very good. For bread-baking, I preheat the oven to 500 deg., and leave the switch at "full" for five minutes to allow the loaves to rise. The switch is then turned to "low" for 45 minutes and "off" for the last 10 to 15 minutes. The result is beautifully browned and baked loaves. All pastry cooked in this oven achieves a rich golden brown appearance, and tastes equally good. Large cakes are put in the oven when the thermometer registers 400 deg., and to allow for the opening of the door I leave the switch at "full" for five minutes, then turn it to the "low" position for the remainder of the cooking. The residual heat is then used for cooking fruit, milk puddings, &c.

Most hot-plates still need to be further improved, and if it were possible to construct one with a very high loading, and yet provide it with a simmering stage, the demand for it would far exceed the supply. Probably the trouble could be overcome by mounting a four-point standard plug on the back of all hot-plates with a corresponding socket on the boiling-plate mounting, so that by this means interchangeability of plates could be effected. At the discretion of the housewife, either plates of the totally enclosed or open-coil type could be used.

The average cost of electricity per week is 2s. 10d. for cooking and 7d. for refrigerating purposes. When first installing electricity in the house we took advantage of the "all-in" system, under which there is a fixed charge of 18s. 9d. per quarter and a running charge of ½d. per kWh. The total consumption for the 12 months has amounted to 13,232 kWh, costing £27 11s. 4d., to which must be added the standing charge of 18s. 9d. by 4, equals £3 15s. Thus the total outlay is £31 6s. 4d. for first-class service, without dirt, smell, or worry.

Economics of Hot Water Storage

THE importance of restricting the current consumption of domestic storage-type water heaters to periods when cheap supply is available is emphasised in *Elektrotechnische Zeitschrift* by A. Rittershausen, who attributes the decreasing use of such heaters in Germany to violation of this principle. The curves in fig. 1 depict the annual increase in the number of electric cooking ranges and water storage heaters in use in Germany during the period 1928-32. The number of cookers shows a continuous increase, but the number of storage heaters shows a serious decrease due, in the author's opinion, to the fact that the price per kWh has been increased from the acceptable figure of 4.5 pf. (0.53d. at par) to 6 or 8 pf. (0.7 or 0.94d.) or even more per kWh. Formerly many undertakings found 0.53d. per kWh for night supply quite satisfactory, the revenue at 7 hr. per night amounting to about £5 12s. per kW per annum and, in view of subsequent reductions in generating costs, it should now be practicable to supply at even lower rates.

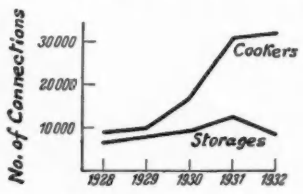


Fig. 1

At the end of 1932 there were 108,000 electric cookers in Germany and only 50,500 storage-type water heaters, many of which were not in kitchens, so that more than 60,000 electric kitchens had not the advantage of cheap hot water. As over 50 per cent. of the energy consumption in a kitchen is for water-heating, the absence of storage heaters is a serious consideration. Moreover, it is essential that the stored heat be cheap (night tariff) energy. Not only is the night consumption desirable from the standpoint of filling the valleys in the station load curve, but also the housewife will rightly argue that there is no point in paying for a storage heater if it is to use energy at the same tariff as that supplied to the cooker. Even the use of day current for boosting or making-up the storage water should be avoided as completely as possible.

The ideal is the consumption of 50 per cent. of the total energy requirements of the kitchen during the night at about 0.5d. per kWh and under automatic thermostatic control which eliminates all waste. Such an arrangement enables the householder to save about 25 per cent., compared with the cost of doing the same cooking and water heating by day current alone, and the arrangement is equally attractive to the supply authority in that it provides night load and encourages the increased total domestic use of electricity. During 1932 sixteen German makers delivered 8,200 storage-type water heaters, whereas eight Swiss firms installed twice as many during the same year. The author suggests that the 17-million German householders ought, therefore, to be equipped with storage heaters at the rate of at least 82,000 per annum, corresponding to more than 125 million kWh per annum.

In order to avoid the use of day current for the supplementary heating of storages, it is necessary that water at or above 60 deg. C. (140 deg. F.) should be available at least until the afternoon and preferably until the evening. Whether this condition is fulfilled depends mainly on the method by which hot water is drawn off. In fig. 2 the diagrams *a*, *b* refer respectively to Swiss and German displacement-type storages, while *c* refers to a German run-off storage. In these diagrams A represents water about to be drawn off, and B the hot water then remaining in store. At 8 a.m. (upper row of diagrams) 10 litres (2.2 gal.) is run off at about 80 deg. C. (176 deg. F.) from the top of storages *a*, *b*, and from the bottom of *c*; a corresponding amount of cold water enters at the bottom in *a* and *b*, while air enters *c*.

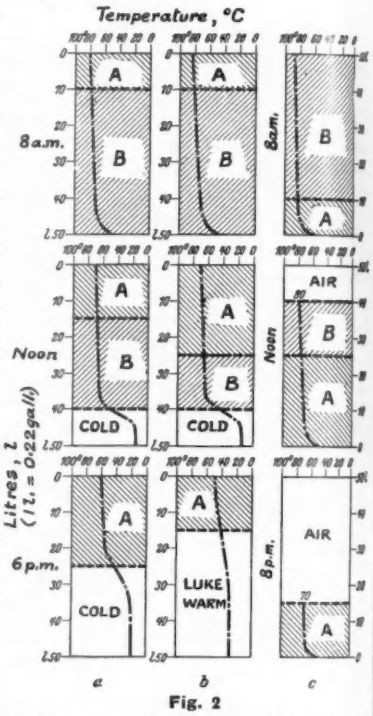
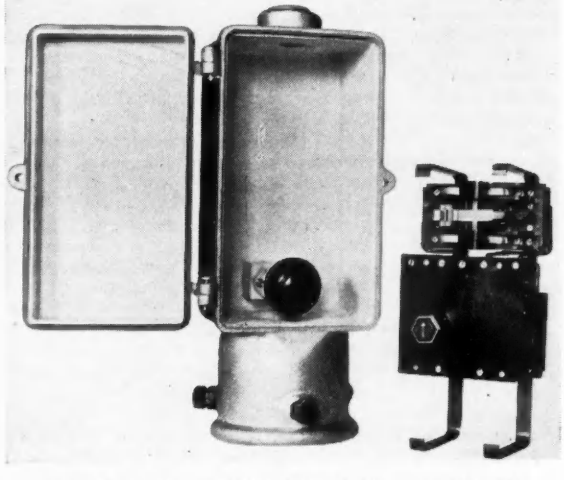


Fig. 2

At noon water at about 70 deg. C. (158 deg. F.) is drawn off, 15 litres (3.3 gal.) from *a*, and 25 litres (5.5 gal.) from *b* and *c*. Finally, at 6 p.m., there is 25 litres (5.5 gal.) left in *a* for withdrawal at about 60 deg. C. (140 deg. F.); and, at 8 p.m., 15 litres (3.3 gal) in *c* at about 70 deg. C. (158 deg. F.); but *b* contains, at 6 p.m., only 15 litres (3.3 gal.) of water at 40-50 deg. C. (104-122 deg. F.) and 35 litres (7.7 gal.) of luke-warm water at 30-40 deg. C. (86-104 deg. F.). A storage having the last-mentioned characteristics must be boosted by more or less expenditure of day current, thus departing from the basic principle of using only night-tariff supply for water heating. Thousands of storage installations of this type are in use in Germany, and the author considers that they are largely responsible for the present unsatisfactory rate of development.

Automatic Street Lighting Control

WE recently had an opportunity of witnessing a demonstration of the new light-sensitive control system for public lamps introduced by Radiovisor Parent, Ltd. The chief difference between this and the older type is that the valve amplifier has been dispensed with and maintenance, it is claimed, should be negligible since, apart from the electromagnetically operated switch which normally operates only twice a day, there are no moving parts.


The Radiovisor 1,500-W street lighting control unit

The unit consists essentially of a selenium bridge which responds to varying intensity of daylight and of the electromechanism operated by this response. The cell is connected in series with a resistance, the potential across which also alters with the intensity of the light. A condenser connected between the terminals of the resistance acquires a charge at the same potential and at dark the current passed by the bridge raises this potential to the striking voltage of a small discharge tube which allows current from the accumulated charge to flow through the winding of the electromagnetically operated switch.

By applying the relay circuit first across the resistance in series with the bridge and then across the bridge itself, switching on and off is effected, a set of contacts on the relay acting as a single-pole change-over switch. As the resistance of the cell is of the order of megohms, the stored charge in the condenser gives a comparatively heavy current for operating the switch.

The units are contained in weatherproof cast-iron boxes for either lamp standard or wall fixing, and are in ranges to suit various loads. They are operated directly from the main supply and will function on either d.c. or, with the incorporation of a small rectifier, on a.c. The intensity of light at which operation takes place is adjustable. We were informed that the critical potential for the discharge tube is built up quickly enough to enable frequent operation to take place promptly.

Scientists and Engineers at Aberdeen

Water-power, thyratrons, and lighting discussed

THERE was no falling off this year in the attendance at the British Association meeting in Aberdeen, the figures on the second day being 2,800, which, if anything, is above the average of the past few years. As we reported in our last issue, the meeting opened on September 5th with the delivery of the presidential address by Sir James H. Jeans, F.R.S., and the various sectional meetings started on the following morning. On Thursday morning Prof. F. G. Baily delivered his address as president of Section G—Engineering, his subject being "Sources of Cheap Electric Power." The address was dealt with by us last week.

The first paper in Section G also dealt with electric power supplies, Mr. W. T. Halcrow giving some interesting information with regard to Scottish hydro-electric power stations. The author pointed out that the development of water power on a considerable scale in the British Isles had resulted from the report of the Water Power Resources Committee appointed by the Government in 1918. No fewer than four schemes described in the report were the subject of Bills in Parliament between 1921 and 1923. The construction of the grid had further accelerated the development of certain water-power schemes by bringing them within the bounds of economic development for general purposes. The Galloway scheme was a typical case; in this instance almost the whole output would be transmitted by the grid to Central Scotland and North-West England.

King's College, Aberdeen University, floodlighted for the B.A. Meeting

In Scotland 169,700 kW of plant was in operation or under construction, the largest being the Lochaber Scheme with 80,000 kW. The development of a further 155,600 kW was proposed, including 59,000 kW at Glen Affric. In the Highlands there existed a large number of lochs up to 1,200 ft. above sea level, most of which could be readily adapted as storage reservoirs, and this fact, coupled with the suitability of topographical features and the high average annual rainfall, made that part of the country eminently suitable for the development of water power.

There were three main types of water-power developments in Scotland. (1) Those with a fully regulated flow from the catchment area giving a continuous output at 90 to 100 per cent. load factor, and generally supplying power to a factory employing electro-metallurgical or other continuous process. (2) Those with a fully regulated flow but working on much lower load factor and used for supplying power for general purposes. (3) Those with a partially regulated flow and having little or no storage. The load factor is usually very low owing to the wide fluctuations in the quantity of water available.

Some Examples Described

As examples of the three classes, the author briefly described (1) the stations at Foyers, Kinlochleven and Lochaber, all of which belong to the British Aluminium Co., Ltd.; (2) the Glen Affric scheme, the Grampian Electricity Supply Co.'s installation and the Loch Luichart station; and (3) the Bonnington and Stonebyres stations of the Clyde Valley Electric Power Co. He also mentioned the Galloway scheme, and went on to say that the continuous output of the schemes described and those schemes which had been planned but which so far had not received Parliamentary sanction was estimated at about 325,000 kW, proving that the potential water-power resources of Scotland were considerably greater than was indicated by the preliminary investigations undertaken by the Water Power Resources Committee (217,965 kW). Water-power stations generally had to be developed in large units. Notwithstanding the handicap of heavy initial expenditure, however, it was found that the cost per unit generated by water was less than by steam in stations of similar capacity.

Opening the discussion, Prof. Sir Thomas Hudson Beare commented on the question of the comparative cost of generating electric power by steam and by water; he remarked that where, as in the case of the British Aluminium Co., the power was used for metallurgical purposes, water power was cheaper. Where, however, the power was required for general purposes and the load factor was low, as it would be in the Galloway scheme, he was inclined to think that the cost would be greater than if steam were used.

Capt. W. N. McClean expressed the view that a careful survey of the water power available in this country was very necessary, together with continual records throughout the year of storage and run off. Another matter for consideration was the effect upon the amenities of a district following the use of water power. Prof. W. Blackadder said that he totally disagreed with the view that hydro-electric works destroyed the amenities of the countryside. The works at Rannoch improved the countryside rather than spoiled it.

The President said it was very difficult to assess a definite period for the repayment of the capital on the civil engineering works of such schemes if the period were to coincide approximately with the life of the works. Speaking generally, it seemed that unless there were some catastrophe they would last for ever, but perhaps that matter ought to be regarded not so much as the period in which the works could be written off within their lifetime as what was likely to happen in, say, 100 years time and whether conditions would have changed by then in such a manner as to render the works obsolete.

Mr. Halcrow, replying to the discussion, said that little damage had been done to amenities so far by hydro-electric schemes. The avoidance of cracks in dams, mentioned by Sir Thomas Hudson Beare, was always a problem, but he was not quite so certain that the problem had been overcome even yet. He agreed with Captain McClean as to the necessity for accurately gauging our rivers; work in that connection was being carried out by the B.A. Committee which was appointed at York two years ago. The period usually adopted for repayment of capital on the civil engineering works was seventy-five years, and the figure mentioned in the paper was merely for the purposes of comparison in a general way.

Thyratron Control

A series of short papers was contributed by members of the B.T.H. Co.'s Research Staff at the joint meeting of Sections A and G on September 6th. Mr. H. de B. Knight discussed the application of thyratrons, with special reference to the control of resistance welding, and explained that the thyratron was a gaseous discharge device through which current flowed in the form of an arc and in which the current flow could be controlled by means of a control electrode or grid. A large range of such devices was available with ratings varying from a fraction of an ampere to 100 A or more. The advantages claimed for it were summarised as follows: (1) the controlling power was very small; (2) the operation was instantaneous and was not limited by mechanical inertia. The experiments of the B.T.H. Co. had shown that the thyratron response took place within less than one micro-second under suitable current conditions. This permitted the precise control of heavy currents of short duration, if required; (3) there was no wear such as took place, for example, at contactor tips due to arcing; (4) the operation was silent. The numerous fields of application were roughly classified as amplification, regulation, power control and special applications.

Another good example of floodlighting at Aberdeen—Marischal College

Dealing specially with resistance welding the author said that by means of the thyratron the time of duration could be reduced to a single cycle or, in some cases, to half a cycle, of supply frequency. The method whereby the thyratron was employed to control the welding impulses was shown diagram-

matically, and it was pointed out that the actual timing varied according to whether spot welding or seam welding was under consideration.

Finally, Mr. de B. Knight emphasised the application of the thyratron in fields where the speed of operation, the precision and the reliability required were beyond the scope of mechanical devices.

Messrs. L. J. Davies and J. H. Mitchell, of the B.T.H. Co., presented a short paper showing the importance of resonance in connection with the nature of the light output from various types of electric discharge lamps. The authors dealt with the resonance and general emission spectra, together with other physical properties, of various elements and discussed them with a view to their possible utilisation in discharge lamps. In particular, resonance phenomena for the cases of mercury and sodium were dealt with. It was shown how under certain conditions there was a possibility of the resonance effect being utilised to advantage as regards the efficiency of the lamp, whilst in other circumstances a cumulative excitation would lead to a decrease in the efficiency. It was also shown how there is a shifting of the unwanted ultra-violet light into visible radiation on account of secondary resonance effect, and the authors mentioned that they were following up the study of these effects.

Ultra-violet Radiation

"Commercial Production and Utilisation of Ultra-violet Radiation" was the subject of another short paper by Mr H. R. Ruff (B.T.H. Co.), who emphasised the manner in which the large scale utilisation of ultra-violet radiation for such purposes as artificial lighting, the manufacture of special chemicals and the sterilisation of foodstuffs, utensils and the water of swimming baths was assuming a rapidly increasing importance.

There were three main industrial uses for ultra-violet radiation—the incorporation of ultra-violet radiation sources into definite engineering structures to utilise their sterilising power; the building of units for the irradiation of foodstuffs to give definite chemical changes; and the tendency to incorporate ultra-violet radiation into artificial lighting. It was pointed out how desirable it was that these radiation units should be rated in common units. It seemed to the author to be fundamentally correct that the units employed should be those of energy, since in order to carry out any operation the energy in the radiation was absorbed and in order to obtain the radiant energy a given amount of power had to be expended.

The difficulty that equal amounts of energy at different wave lengths were differently effective for various uses appeared to be best overcome by employing factors for the various functions of the radiation. The use of "Finsen" units as a basis for the erythemal effectiveness of different units had already been suggested.

The paper concluded with a discussion of the tendency to employ artificial light sources containing the short wave lengths or, as it was sometimes termed, the health ultra-violet radiation in sunlight, and described the "Mazda Sunlamp," which had been rated in definite units to enable its effectiveness for this work to be adjudged. This combined the radiation from a mercury vapour arc with that of continuous radiation from white-hot electrodes, so that the ultra-violet energy in the particular region selected was increased by approximately thirty times relative to the visible light radiated, as compared with natural sunlight. Thus, with a light intensity of some 200 ft.-candles an ultra-violet radiation intensity of the particular wave length required, similar to that of midsummer sunlight, could be obtained.

Messrs. L. J. Davies and R. Maxted presented a paper on "Some Aspects of Modern Road Illumination." The introduction of electric discharge lamps, apart from the actual merits, had served the most useful purpose of awakening a general interest in road illumination, but while the basic optics of the subject were now well understood the adaptation of these to practical economical schemes and the physiological factors that might modify such schemes needed considerable experience before any fixed ideas and rules could be formulated. The papers dealt with the subject under the four headings: survey of the optical problems involved; difficulties of experimentation; need for correlation between use of road surface materials and lighting, and some points concerning the use of electric discharge lamps.

Remembering that it was not the light falling on the road but that reflected off the road that was of use, and that in order for the light to be suitably distributed on the road it must proceed at various angles and intensities from the illuminant—the observer's eye intercepting various degrees of candle power—it was clear, the authors pointed out, that the maximum control over the light must be used in designing the lantern. A system in use on the Continent consisted of a series of projectors throwing light approximately parallel with the road in the direction of travel of traffic.

After a reference to the difficulties of full-scale experiment in road lighting owing to the cost, the authors said that great care must be exercised in forming conclusions from a study by means of a stationary observer on a miniature road. In this connection some useful model experiments were being made in America, a model road 250 ft. long and 4 ft. wide having been built in Nela Park, it being sufficiently strong to enable an observer to be moved along it at scale speed.

The view of the authors was that the present system of road lighting was the only practicable one, but that efforts must be made to improve it along certain lines. Two that were the most suggestive were the use of reflecting road surfaces and the accurate control of the flux emitted by the illuminant by correct design. An ideal surface would be a true matt one, although this might prove trying to the eyes in daytime. A useful surface, however, would be grey matt, whether wet or dry, and it was also considered that one of the earliest of road surfaces, viz., cobble stones, was very good in this respect. It was suggested, however, that experiments should be carried out by road engineers in this connection, and the hope was expressed that this aspect would receive more attention.

Flux control and lantern design were considered to be a special subject. The newer electric discharge lamps possessed economy of operation and might have certain valuable features associated with acuity of vision. Until recently, however, accurate flux control had been difficult owing to the necessity for operating the lamps vertically. A recent improvement, however, now enabled these lamps to be operated horizontally.

The Temperature of Molten Steel

In a paper before a joint meeting of Sections A (Mathematics and Physical Sciences) and G (Engineering) on September 6th, Mr. R. S. Whipple discussed some of the difficulties of measuring the temperature of molten steel. He pointed out that while in 1917 Dr. W. H. Hatfield stated that "although the temperature at which steels are cast must have an influence upon their ultimate physical properties, no ready and reliable method of measuring such temperatures from the works standpoint is available. This is a considered statement" he was sorry to have to say in 1934 that although the need was still as insistent as ever, no completely satisfactory method of taking the temperature of molten steel had yet been evolved. The practical difficulties in making the temperature measurement were great, and could only take the form of compromises. The measurement desired was that of the temperature of the steel itself determined by a pyrometer immersed in it, but unfortunately that was not practicably obtainable, although some work done by Dr. Fitterer gave some hope that it might be possible, some day in the near future, to immerse successfully a thermo-couple in a bath of steel.

The Reduction of Noise

On Monday last Section G (Engineering) devoted its meeting to a general discussion on the reduction of noise when Sir Henry Fowler, chairman of the committee appointed at the Leicester meeting last year to investigate this subject, presented the Committee's first report. The first consideration has been given to the problem of the exhaust from motor cycles and in that connection the question of suitable noise-measuring instruments has come under review and a paper on that aspect of the problem was submitted by Dr. A. H. Davis of the National Physical Laboratory.

Dr. Davis described an objective instrument to give an indication of the overall loudness of sounds as observed by the ear. This was a portable instrument which he has designed and which has been used for several years at the N.P.L. for various classes of acoustical work. It incorporates a condenser microphone and when the ear-simulating circuit is not in use the equipment is nearly equally sensitive for notes of all frequencies. Dials are provided for altering the sensitivity over a wide range. The ear-simulating circuit corresponds to that required for correctly comparing sounds at an appropriate loudness level. By means of a switch it can be included or removed from the amplifier circuit as desired.

The indicator is quick moving and since a full indication of loudness is obtained in about 0.3 second after the application of a steady noise, the apparatus agrees roughly in this respect with the human ear. The rectifier, of grid leak type, nearly linear in response, could easily be replaced by a quadratic rectifier or by a peak voltmeter. An output plug allows a cathode-ray oscillograph to be connected to the output of the amplifier when desired, the rectifier and indicator being automatically removed from the circuit in the process.

The instrument can also be used for the analysis of sounds. For this purpose, one or two tunable electrical circuits or filter circuits are plugged into the amplifier at points provided and the instrument then measures intensity of components in selected frequency bands. The necessary batteries may be housed in a case the same size and shape as that which contains the instrument itself.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

"The Shannon's Shortcomings"

Adverting to the note on page 324 of your current issue we in Ireland who know the facts of the case suppose that the articles which appeared in two London papers recently were intended to serve some obscure political purpose, with which your readers, as engineers, have no concern.

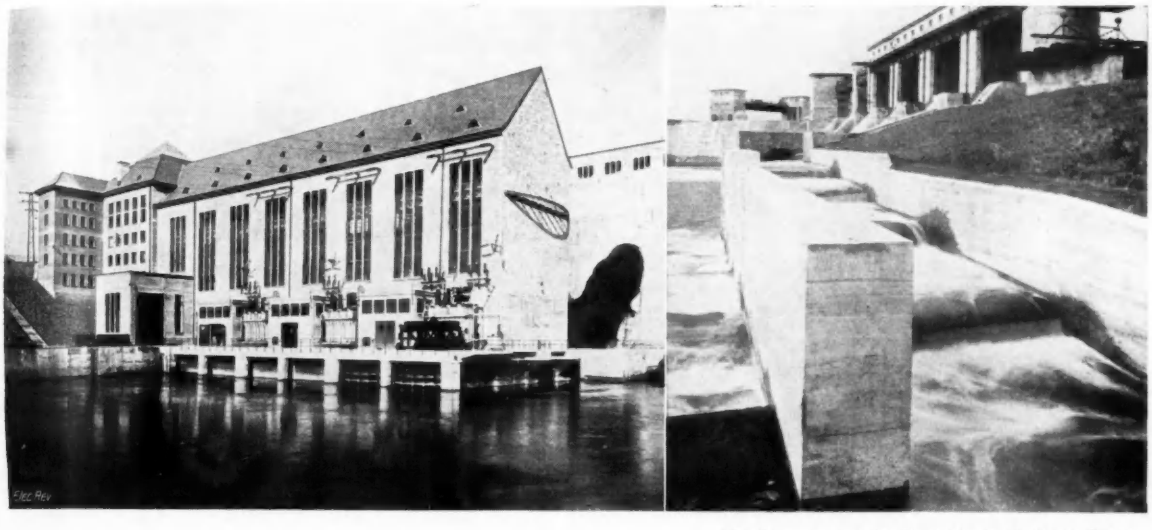
The Shannon Scheme has become part (at present the major part) of our national electricity supply undertaking, which includes a small steam station in Cork and a capital steam station in Dublin, which has been greatly improved and doubled in capacity since it was taken over from the Dublin Corporation. The year before last water-power contributed the quota anticipated by the original consulting engineers, although there were two consecutive dry years. Last year the drought was so prolonged that the flow in the Shannon was less than half that recorded in 1905, which was itself the driest year within fifty or sixty years during which official records had been made.

On the experts' reckoning the 1933 load with the 1905 flow would require some 15 million kWh to be generated by steam. With only half that flow, and a rapidly degenerating head, obviously 30 million kWh or more would have to be provided by the steam reserve; and on top of that was the increased output over 1933 (185 million kWh against 166 million kWh). As the additional storage recommended by the consultants had not yet been provided, the Electricity Supply Board was bound to exercise the most drastic economy of water and consequently ran the Dublin station for all it was worth.

The fact is that the rate of increase of demand has outstripped the estimates of the consultants, and the only criticism which outsiders can urge against the Board is that it recognised the fact somewhat tardily. The Bill now in progress makes amends for that. The undertaking will enter the coming winter, and will face the future, with greater confidence and a larger measure of goodwill than ever before.

The total sum advanced by the Government to the Board to date is £9,683,621, and it must be understood that this covers the capital cost of generation, transmission, and distribution to the actual consumer. The amount still available for the Board, including £530,000 under the new Bill, is £1,977,067. Work will be started at once on the three Shannon lakes in order to double the present storage capacity. Many millions will be spent during the next ten years in keeping ahead of demand, and the exact lines upon which extension of power production will proceed are under consideration. In order to avoid misunderstanding I must say that I have no access to any information other than was available to the writer of the misleading article mentioned above and quoted by you.

Dublin, *September 8th.* ROBERT N. TWEEDY.



[By the courtesy of the Electricity Supply Board, Dublin

The Ardnacrusha power house of the Shannon Scheme and (right) a section of the fish pass at the weir dam

"Lay" in Cables

Mr. Bradshaw's article on this subject in your issue of August 31st, is of timely interest to those connected with electrical distribution—particularly jointers. Of outstanding importance is the examination of cable ends previous to laying, so as to obviate as much as possible the disturbance of the dielectric during jointing operations, which is one of the greatest arts in that highly skilled job.

Where the cable ends are not opened, jointers should make staggered joints, that is on l.v. work where colour must meet colour and in many instances must be done "alive." This, of course, entails the use of a much longer sleeve, but it is far preferable to the "butt joint," particularly so when the cable has a short "lay."

Short "lay" cables should not be used for services unless the jointer is exceptionally skilful owing to the excessive force required to open the cores, and to the difficulty of efficiently insulating after sweating.

All straight-through joints should, as far as possible, follow the same "lay" as the cable, be neat, symmetrical, and have a uniform clearance between the cores and sleeve.

Taking the case of a 0.3-sq. in. five-core cable (*i.e.*, four 0.3 and one 0.225 sq. in. conductors) with a "lay" of 36 in. and jointed with a central butt, I have found instances where it has been scarcely possible to enclose the completed joint in a split lead sleeve 24 in. by 5 in. and then only after beating the sleeve into irregular shape to suit the ugly projections of the cores; in this case the cable has been laid at random.

Where cable ends have been examined and laid accordingly, the same joint can be accommodated in a solid tubular sleeve, 18½ in. by 4 in., and with a uniform clearance of 3/16 in. between insulated cores and sleeve, and ¼ in. clearance between each core, and made with no possible disturbance of the "crutch." Mr. Bradshaw's excellent article should appeal strongly to those who have sound jointing at heart, as the ultimate and lasting success of any distribution system does depend on the "plumber-jointer," and more so when jointing must be done "alive" on cables of such short "lay" and compactness, so let us have cables of long "lay" and life.

Brighton, *September 8th.* WILLIAM MASKERY.

Double-ended Motors

If "Simple Laddie" wants motors with shaft extensions at each end, he will have no difficulty in obtaining them, for many hundreds are put into commission every year for drives which require them.

The reason why they are not standard is probably two-fold; first, if the second extension is not required, it gives the motor an ugly appearance; secondly, it would have to be fitted with some sort of guard which would add to the cost.

Wylde Green, Birmingham, *Sept. 7th.* W. P. RICHARDSON.

The Status of the Consumers' Engineer

As you have stated on many occasions, the future development of the electrical industry will necessitate a large increase in the number of consumers' or sales engineers employed. At present these men are not recognised as "engineers" in the true sense of the word. In each supply authority they are given different titles and even the scope of their work varies

to an enormous extent. They are called inspectors by some, representatives by others, and occasionally sales or consumers' engineers. Their work may be anything from managing a showroom and its surrounding district to merely inspecting the work carried out by the wiremen.

In these circumstances their unofficial title is practically valueless. To make matters still worse those men who have sufficient knowledge to warrant the title "engineer" are included under this heading in common with others who have had less experience and training.

There is only one way in which a consumers' engineer can prove the extent of his knowledge and that is by passing the I.E.E. examination. This examination does not deal with the domestic side of electrical engineering and it is, therefore, no real guide to a man's ability in this direction. Further, to one who has chosen the domestic side of the electrical business as his career it constitutes a definite waste of time and a serious bar to his progress.

Surely it is possible for an appropriate examination to be set on this subject. The I.E.E. would find, for instance, that such a scheme would meet with universal approval. The idea could be carried still further by admitting engineers who pass the examination into the Institution on equal terms with the other members. The examination should be on a level with the present one but devoted to domestic electricity.

I believe that the average consumers' engineer rather feels that he is looked down upon by the "heavy" engineer. That this feeling should exist only proves that there is something wrong with the system. Generation and distribution may be big problems but they are certainly not the only engineering problems.

Sooner or later an attempt will be made to form another association unless the I.E.E. makes a definite move.

London, W.14, *September 7th.* J. RUSSELL HICKMOTT.

A Minute Current Wanted

For the purpose of making an experiment, I need an impulse which will be sufficient to start a small current, about 1 amp., by means of a gasfilled or other valve. To give me the required impulse I have a changing area of light, *i.e.*, a beam reflected through a lens.

What I wish to know is how much light acting on a selenium cell will be necessary to give me about 10^{-12} watt-second. I hope that one of your readers will enlighten me to enable me to proceed with my experiment. H. ANDERSON.

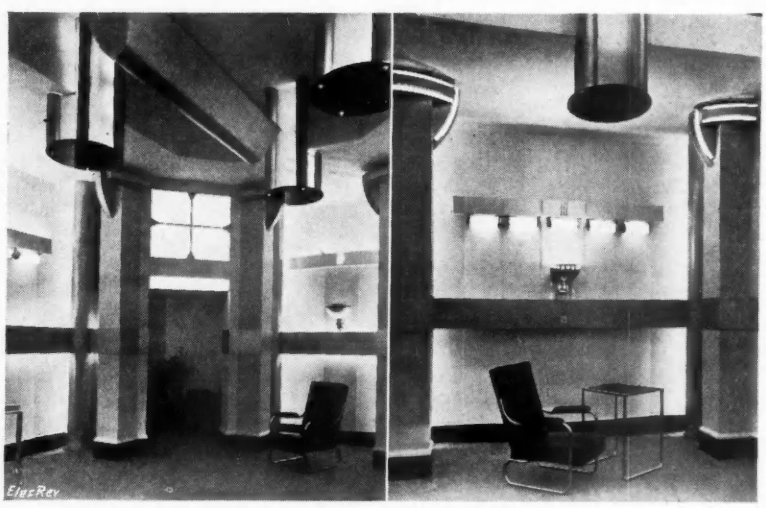
Southsea, Hants, *September 7th.*

Lighting Service

THE lecture and demonstration theatre of the Lighting Service Bureau at 2, Savoy Hill, W.C., has been remodelled. An open "egg-box" ceiling provides good ventilation, and the attachment to it of large plywood discs gives the requisite reflecting surface for groups of fittings. The general decorative scheme is most pleasing.

On the underside of three transverse beams are sixty-four yellow and white 24-in. straight tubular lamps. On three sides at frieze level are eight designs in light made up with similar lamps in flame and white. A floral design, together with coffers and circular glazed panels over the platform, completes the built-in lighting of the theatre.

Several systems of illumination are ready for demonstration: 1. High-intensity overhead factory lighting employing dispersive reflectors and obscured lamps. 2. Glareless overhead lighting by industrial diffusing fittings. 3. A new type of silvered glass industrial fitting. 4. General overhead lighting from industrial diffusing fittings giving corrected light (approximating to daylight) to enable accurate discrimination of coloured objects, stains and imperfections to be made. 5. A system suitable for the general lighting of shops, offices and other commercial interiors, employing spherical diffusing fittings with a low surface brightness. 6. A drop pendant system with enamelled iron or conical opal shades demonstrating the inefficient and discomforting result.



Two corners of the remodelled Lighting Service Bureau

Some of these systems are controlled by a theatre-type dimmer, which enables a wide range of illumination intensities to be obtained throughout the room, while the voltage of supply under the various conditions of dimming is shown on a large swing-panel voltmeter.

A simple photometer provides visual indication that the new 40-W coiled-coil filament lamp (in which the coiled coil presents a smaller surface to the inert gas, thus reducing heat losses) does provide 20 per cent. more light for the same energy consumption than the equivalent gasfilled lamp. This is probably the greatest advance in filament lamp technique for twenty years. It is anticipated that a 60-W size will be available early next year.

A new "architectural tubular" lamp enables a lighting scheme to consist of continuous lines of light of almost any shape, and different colours. These lamps are available in straight lengths of 20, 24, 40, and 48 in. and ½-, ¼- and ⅛-in. circles. They are fitted with side contacts so that they can be butted together to give continuity.

The architectural lighting room, the first in Europe, has been completely remodelled under the supervision of the Bureau architect, and architects and designers can experiment with the various lighting systems. Whole walls are lighted vertically and horizontally illustrating the plastic nature of lighting architecture. The entrance door embodies the colorama principle of lighting; for adding lustre, clear glass rods are inserted in the vertical coves.

There are ten different ways of lighting the studio, each one a practical system that can be applied in shops, public buildings, theatres, &c.

(1) A suspended trough provides indirect illumination from 1,200 W, giving an illumination at 3 ft. from the ground of 20 ft.-candles. (2) Illumination from four lighting features on the sides of the recessed ceiling. Vertical coves conceal the lamps and light up the main vertical curved faces of the fitting; the green sprayed tips of the single-ended tubular lamps protrude through the glass base. (3) A cornice arranged at the head of a succession of vertical planes projecting from the surface of the wall provides another means of lighting the room. Glass plates inserted in the cornices give contrast to the otherwise diffused effect. (4) An illustration of the functional use of fittings in design. A green semi-translucent medium round the rim of the reflector adds a touch of colour while screening direct view of the lamp. (5) Vertical coves of sheet metal reach from floor to ceiling, the lamps being concealed in the curl of the cove. Light is directed on the projecting planes of the wall and adds emphasis to the vertical feeling of the wall decoration.

(6) In contrast to the last system a horizontal feeling is introduced by a band somewhat below eye level concealing two lighting systems, one of which floods the upper portion of the walls and the other the lower. (7) The studio can also be lighted from four luminous panels above the openings to the corner recesses; yellow opal glass in lead framing is illuminated from behind. (8) Tubular lamps, designed as caps to the wall ends and fixed to templet moulds of the same shape as the lamps themselves, provide an indication of the possibilities of these lamps in architectural design.

(9) A novel form of grill in one of the recesses can be illuminated by daylight from the window behind, or by small lamps interspaced in the grill features providing a pattern of coloured discs and triangular boxes. (10) An interesting possibility is shown by lighting chromium chain from behind.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Unusual Lampholder

When a bell-shaped glass shade is used with a pendant lamp some difficulty is often experienced in fitting the shade ring when replacing it after cleaning. Last year RAY MOULDINGS, LTD., Empire Works, Exhibition Estate, Wembley, introduced at the Inventions Exhibition a specially designed combined lamp and shade-holder which gained an award. This device has now been placed on the market.

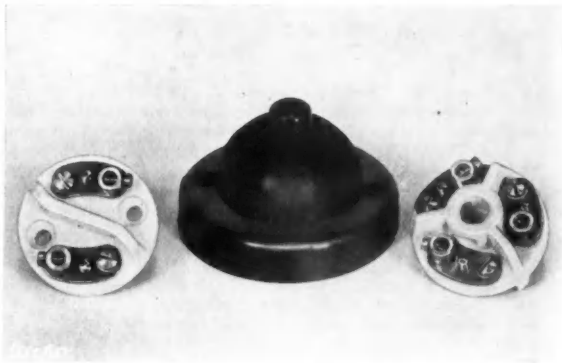
The components of the Ray lampholder

The movable shade ring is dispensed with, its place being taken by the moulded collar on the lampholder section. The flex is brought through the dome in the usual manner, although at the top of the dome there is a special type of grip incorporating a fibre washer which enables the dome to remain suspended on the cord of its own accord instead of slipping down while the wireman connects up the leads to the centre body. This latter has special slots forming a cord grip shaped like three sides of a square (a double right angle) so that when the dome is screwed down it is practically impossible to pull the flex out.

The shade is then fitted on the lampholder section above the collar. The centre body contains two sockets to which the leads are connected and the lampholder section has two solid plunger contacts surrounded by an external spring. When this section is screwed into the dome the plungers, which on the inside are split pins, fit into the sockets of the centre piece, thus conveying the current to the plungers. The screw threads underneath the collar are only for a H.O. skirt. The holders are made of bakelite in various colours and cost 7s. per dozen.

A Bakelite Ceiling Rose

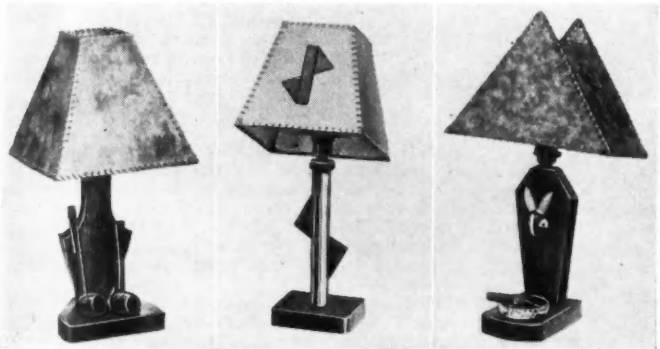
MESSRS. C. W. OUTRAM & CO., LTD., Woodville, Burton-on-Trent, have sent us a sample bakelite ceiling rose which will take a two-plate or three-plate vitreous porcelain interior. "Tracking" is avoided and as the cover contains four knock-outs as well as fixing holes it can be used for surface wiring without a wood block. Fixing holes in the interiors have also been provided and the ordinary pattern kidney shaped fittings are used. A cord grip is made by looping in the wires through holes in the bridge in a similar manner to the standard pattern rose.



The Outram ceiling rose

V-Rope Drives

A new range of V-ropes, 10 mm. by 6 mm., known as the "Vulco No. 1" series, has been introduced by MESSRS. SMITH & GRACE, Thrapston, near Kettering, for use with fractional h.p. motors and light machinery drives.



Three new table standards by Maurice Bobin

Novel Table Standards

The smoker is well catered for in a range of new table standards introduced by MESSRS. MAURICE BOBIN, 15, Farringdon Avenue, London, E.C.4. Three examples are shown in the accompanying illustration: the left-hand model costs 16s. and is made of solid mahogany with a Jacobean parchment shade. Solid mahogany is also used for the standard on the right which costs 15s. A striking effect is given by the sharp lines of type 340 (centre) with its chromium-plated stand, erinoid tipped, and its solid oak base. With a sheepskin parchment shade the price is 19s. 6d.

Another novelty which is worthy of special mention is an electric table standard for the dressing table. The sloping stem is covered by a mirror and the solid mahogany base is large enough to take all the essential beauty preparations. The shade can be tilted in such a way that the user has the full light on her face. The fitting costs 29s. 6d. There is also an unusual table lamp which acts as a book stand. This costs 21s.

Bright-dim Conversion Set

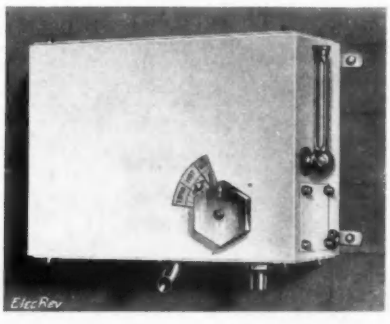
We illustrate below a bright and dim light conversion set which has been sent to us by MESSRS. WARD & GOLDSTONE, LTD., Frederick Road, Pendleton, Salford. Either light can be obtained by the operation of the neat switch, and a 5-W lamp can be fitted in the angle socket to give a dim light. The price is 4s. 3d.

The "Goltone" conversion set

The Whitetherm Water-heater

A water-heater which is, in effect, an electric geyser combining a one-gallon storage tank is being marketed by the WHITETHERM COMPANY, 85, Hatton Garden, London, E.C.1. When functioning as a geyser the heater will deliver one pint per minute of boiling water or a correspondingly larger quantity of hot or warm water up to a maximum of four pints per minute. The temperature, and hence the amount of water available in a given period, is controlled by a switch which can be set to "warm" or "hot."

The makers also claim that delivery in bulk up to one gallon may be obtained, provided sufficient time is allowed for the water to heat up. The water is obtained by turning the handle to the desired heat which is clearly shown on the scale, the "boiling line" being sharply defined by a full red line. On turning the handle to the heat required water starts to accumulate at the desired temperature. In a few



The Whitetherm water heater which gives a supply at a predetermined temperature

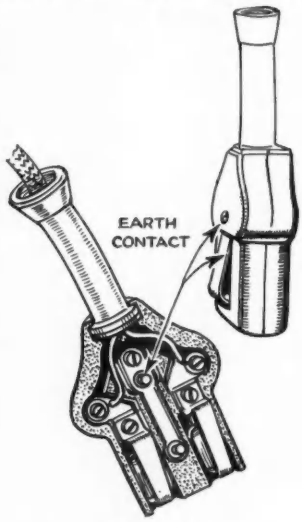
moments, according to the temperature and quantity required, the desired amount will be visibly indicated in pints on the protected glass tube at the side of the tank. Turning the handle to the "off" position will then automatically release the heated or boiling water. If the heater is allowed to accumulate to its full capacity, one gallon, it will commence to deliver water at the preselected temperature by way of overflow. The element is of the immersion type.

The heater is constructed of heavy gauge copper, and all water surfaces are heavily tinned. Connection to the water supply is provided by a standard union coupling suitable for ½-in. feed water pipes. The electrical connections are brought to main service terminals, easily accessible for connecting, and separate earthing is provided. In the case of the 3-kW "Junior" model (illustrated), lugs are provided for wall fixing above lavatory basins or sinks but there are two larger models for kitchen requirements and for bath water supply.

The "Anka" Adaptor

The "Ankaflex" cable was introduced by CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment, London, E.C.4, with a view to preventing broken and badly twisted flexibles, but the company has found since that breakages occur due to the use of an unsuitable adaptor. To overcome this they have introduced a special "Anka" adaptor.

In order that the best possible results may be obtained it is sold only with "Ankaflex" and it has been placed on the market in two alternative packings. In each case it is fitted with three yards of 23/.0076 in. (3-A capacity) "Ankaflex"; in packing "A" there is twin flexible with a standard bakelite b.c. lamp adaptor already attached. In packing "B" 3-core "Ankaflex" is fitted with the supply end trimmed back ready for connecting to a 3-pin plug. In both cases the adaptor unit is packed in an attractive box with a transparent cellophane window.



The "Anka" adaptor

It will be observed from the drawing that there is no gripping of the flexible at the point of entry to the adaptor; a strong fibre disc for attaching to the cord strengtheners prevents any strain on the conductors, and specially designed terminals permit easy wiring. The earthing device automatically earths the case of the iron, and a bell mouth rubber sleeve is used instead of a coiled spring.

"Magnet" Electric Fires

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, is this season introducing some striking and attractive types of fires to meet the demand for chromium-plated reflectors and rod-type elements. The rod elements are of the plug-in type, so that the fitting of the elements is entirely free from the removal of any screws or nuts. All "Magnet" fires employing rod elements are manufactured from "Staybrite."

The new series comprises three portable models—D.2700 (1 kW), D.2704 (2¼ kW), and D.2706 (2½ kW). In these a U-shaped slot is embodied in the "Staybrite" contacts into which the element fits, a collar being embodied in the end cap so as to prevent the rod falling out of position due either to misuse or breakage of the element former. In addition a nichrome rod is inserted inside the element rod itself so as to give support should the former be fractured at any time. With this design it is practically impossible for the rod element to fall out.

The D.2700 is fitted with a chromium-plated reflector, the end castings and supporting brackets being available in antique silver, or copper, or in white, blue or green stoved enamel finish. The supporting brackets are so arranged that the fire can be used on the floor, or screwed on the wall. The angle of the reflector can be varied and stops are embodied in the side brackets to prevent the reflector dropping below a certain point. The D.2704 and D.2706 models are of similar design, but are available only in antique copper or silver and are fitted with two 1¼-kW rod-type elements.

The D.2730 is an inset fire, the body of which is finished in chromium plate throughout, and a special deflector is embodied in the top portion of the fire to deflect the convection currents, and thus reduce the possibility of blackening the wall immediately above the fire. This fire is fitted with two 10-A double pole switches, and is supplied complete with a fixing bracket.

The last of the series, the D.2721, a 1-kW inset reflector fire, is a "jamb" fire, and is fitted by fire grate manufacturers or slabbers into the tiled surrounds of coal fireplaces. Usually one is fitted on each side of the fireplace. The reflector is of special design, enabling a 1,000-W element to be fitted vertically within a very confined space, and yet at the same time keeping the back of the element within a safe temperature, thus also reducing the temperature at the back of the fire.

An entirely new range of pedestal heaters is being introduced this season, which, whilst retaining the salient points of previous models, are lower in price. The rose-type element used in the past has been superseded by a 750-W tubular element of a type common to most bowl fires.

There is a new series of inset fires in cast-iron, D.2424/5/6–1, 2 and 3 kW respectively. These are finished in vitreous enamel or chromium plate, and the prices include either fixing bracket for fitting to slate or marble surrounds, or a frame for slabbing into tiled surrounds. These models embody some constructional alterations which have also been incorporated in the companion series in the rustless antique silver or antique copper finish, D.2411/12/13, and 10-A double-pole switches are fitted throughout.

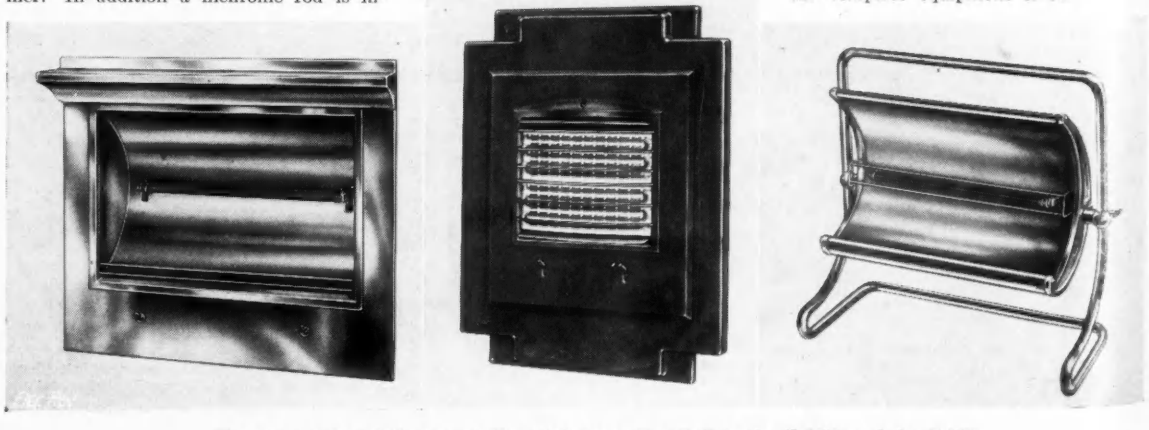
There are two new and inexpensive cast-iron surrounds for use with the 1- and 2-kW fires. These are fitted to the wall by four screws concealed at the back of the fire, and once fitted do not have to be removed in order to effect any repair to the fire itself. The fire is held in position by clips at the bottom and one-hole fixing at the top. They have been primarily designed for use with the D.2424/5 inset fires, but they can also be used with models D.2411/12.

A Magazine Hacksaw Frame

The "Eclipse" magazine hacksaw frame (No. 30 M), complete with six "Eclipse" flexible blades, is the latest production of MESSRS. JAMES NEILL & CO. (SHEFFIELD), LTD., Napier Street, Sheffield. It has been specially designed to meet the requirements of electricians, plumbers, heating engineers, underground mechanics and others whose work is mainly away from their base.

The frame, which is of tubular design, combining strength with lightness, utilises the bow to form the magazine. Five spare blades of assorted pitches of teeth are carried in this magazine so that the correct type of blade is available for every job, whilst upon the handle are instructions enabling the user to select a suitable blade to obtain the best results. Stored in this manner it is impossible for the blades to become damaged by other tools in the kit.

The position and shape of the unbreakable metal handle gives the operator comfortable control with one hand when the frame is used on jobbing work where a vice is not available. Protection for the hand of the operator is ensured by the provision of a long rear tension piece and the use of "Eclipse Flex" unbreakable blades. Both tension pieces are non-detachable, but allow instantaneous swivelling of the blade for cutting at right angles. The price of the complete equipment is 5s.


Three examples of the new "Magnet" fires: The D.2730, the D.2428, and the D.2706

A Public Lighting Exhibition

THE exhibition arranged in connection with the annual conference of the Association of Public Lighting Engineers, which opens at Aberdeen on Monday next, will be of a good representative quality. The firms that are taking advantage of the opportunity to display special productions for this class of work include the following:

British Thomson-Houston Co., Ltd.—"Mazda Mercra" high-pressure mercury-vapour electric discharge lamps, which are now made for 250 W (with an initial luminous output of 8,750 lumens) as well as in the original 400-W size, and lanterns designed for outdoor use with this type of lamp. The exhibit includes the "Mercra H" lantern with magnetic control for keeping the arc in the middle of the lamp bulb by repulsion, thus enabling it to be operated horizontally. This was described in the ELECTRICAL REVIEW of July 27th. The floodlighting of the Marischal College by these lanterns initiated for the British Association meeting will be continued for the conference. Nine posts in Union Terrace will be equipped with "Diron" lanterns with 400-W "Mercra" lamps.

The "Mercra F" lantern, with glazing removed, for a horizontally mounted lamp, specially designed for floodlighting

Concrete Utilities, Ltd.—Two "Arterial" concrete lamp columns standing 14 ft. 6 in. out of the ground and 7 in. at the base tapering to 5 in. A steel tube 2¾ in. in diameter is cast in the centre from the top to the base. This model has flat surfaces which reflect the light, in which it differs from the "Boulevard" type (two examples of which will also be on view) which has similar dimensions but a fluted pedestal.

Edison Swan Electric Co., Ltd.—Lighting fittings for use with the "Escura" electric discharge 420-W lamp giving 16,000 lumens. The improved "Enfield" lantern, incorporating refractors, interior reflectors, and exterior mirror reflectors is being shown for the first time. The lantern can be used for either central suspension or for side brackets; it will be seen in operation in King St. The recently improved "Hertford" lantern shown is designed for side-pole mounting only, attachment being by short clamps instead of a bracket; the highest intensity of illumination is thrown away from the motorist. For the lighting of railway sidings and similar open spaces, the "Wanstead" lantern is exhibited, but a more recent development for the floodlighting of garages, car parks and road houses is the "Waltham" (described in our last issue). The "Saturn" lantern is another design for floodlighting building fronts. Several types of lantern and pole-top units for use with incandescent lamps will also be exhibited by the Edison Swan Co.

The E.L.E.C. "Highway" lantern

Engineering and Lighting Equipment Co., Ltd.—Two fittings specially designed for use with discharge lamps. One of these, the "Highway," is a two-way directional fitting, which can also be used for three-way distribution. As the light source of discharge lamps is about 6 in. long a special system of controlling the light has been used, comprising two swivelling and tilting mirrors, fitted relative to the upper part of the flame (permitting adjustment of the distribution in both the horizontal and vertical planes, and four reflecting plates adjacent to the bottom half of the flame, dealing similarly with this portion, and enabling a considerable length of the flame to be controlled and distributed in the longitudinal direction on to the road. The other is the "Vapoura" fitting which gives spherical distribution for promenades, market squares, and traffic intersections and central suspension. The rippled opalescent glassware has a slight corrective effect on the light. The overall transmission efficiency of this fitting is claimed to be 67 per cent. The company will also be showing its "Pinnacle" two-way directional fitting for 100 to 300-W gasfilled lamps which is designed to direct the main intensity on each side of the fitting towards the centre of the road, and accessory equipment.

General Electric Co., Ltd.—This exhibit includes "Osira" lamps and several types of lanterns designed for distributing the lighting of electric discharge lamps. A cabinet will be shown in which various forms of street lighting will be demonstrated in a model street. Adjacent to the headquarters in Union Street there will be demonstrated various methods of employing "Osira" and "Osram" lamps, "Wembley" lanterns and "Osira" coloured floodlights. Churches in Aberdeen will also be floodlighted throughout the Conference.

Holophane, Ltd.—A range of prismatic refractors including the new "Bowl" pendant model which is suitable for electric discharge lamps; it has a smooth exterior surface and a main beam refraction at 160 deg. A second type, for side-of-street mounting, has a square lantern of prisms and prismatic plates. "Duo-Dome" two-piece refractors and lanterns with smooth exteriors are shown for 200, 300, and 500-W sizes. New features of these units are a one-third refracting segment for side-pole mounting and an alteration of the main beams to 150 deg. to meet the needs of closer spacing.

Three G.E.C. items: Left, the "Lewisham" lantern; right, a diffusing fitting for "Osira" lamps; below, the new 250-W "Osira" lamp

Horstmann Gear Co., Ltd.—"Newbridge" electric time switches, both hand-wound (15 and 42-day) and synchronous-motor driven, with or without solar compensating dials.

Radiovisor Parent, Ltd.—An improved light-sensitive automatic switching system. (See page 340 of this issue.)

Revo Electric Co., Ltd.—Prominent among the exhibits are fittings for discharge lamps, such as the "Metrolux" and the "Leicester" colour-correction lanterns. The "Magnalite" mirror is shown as modified for the h.p. mercury-vapour lamp, and an adaptation to the requirements of the Philips "Philora" lamp. The "Barnsley" fitting now incorporates a refractor dish under the lamp, which is enclosed by refractor glasses, giving a degree of illumination that is claimed to be equivalent to that of a discharge unit. "Magnalite" and "Metrolux" lanterns with discharge lamps will be seen in King St. and "Barnsley" lanterns in Brown St.

Siemens Electric Lamps and Supplies, Ltd.—In addition to the "Sieray" discharge lamps and a comprehensive range of lanterns for street lighting, industrial interiors, and floodlighting, the exhibit includes 40-W pearl or opal coiled-coil filament lamps.

Simplex Electric Co., Ltd.—Lanterns for use with discharge lamps as well as filament lamps with (if required) a symmetrical light distribution to give reduced c.p. in the direction of oncoming traffic. In the new "Duo-Dome" two-piece refractor lantern for lamps of from 100 to 1,000 W, the focusing is adjustable externally. Other exhibits will include central suspension equipments, pole-mounting brackets, dust-proof lantern with chromium plated fitting (as used for the Mersey Tunnel), and installations of "Credalux" lanterns.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures

The 1935 Fair

The Birmingham Section of the 1935 British Industries Fair does not open until May 20th, continuing to May 31st, but already more space has been booked in the Electrical Section than was occupied by all exhibitors in this group at the last Fair. At this year's Fair 147 firms occupied 52,792 sq. ft. in the Electrical Section. So far, 114 of these firms have applied for 46,000 sq. ft at the 1935 Fair, while thirty firms who have not previously exhibited have applied for another 10,000 sq. ft., making a total of 56,000 sq. ft. actually booked. The usual experience at the Fair is that a considerable proportion of exhibitors do not send in their applications for space until within two, or, at most, three, months of the opening date. Some exhibitors, indeed, leave it until much later, with the result that shortly before the Fair is due to open the demand for space exceeds that available. Firms who contemplate showing at Birmingham and have not already booked their space would be well advised to make early application.

A Vacuum Cleaner Display

The accompanying illustration shows a window display which was recently arranged at the showrooms of the Reading Corporation Electricity Department. As will be seen this

A Hotpoint vacuum cleaner display at Reading

attractive setting draws attention to the vacuum cleaners made by the Hotpoint Electric Appliance Co., Ltd., and it aroused considerable local interest.

Ulster Radio Traders' Association

This Association was recently registered in Belfast as a company limited by guarantee without share capital. The objects are to carry on the business of exhibition promoters, organisers of social events, and to promote the general advancement of the radio industry as carried on by the Ulster Radio Trade Association. The subscribers are L. T. Dobbin, 65, North Street, Belfast; R. S. Scott, 6, Fountain Lane, Belfast; A. Fraser Mayne, 6, Donegal Square West, Belfast; I. Brown (Central Radio Stores), 6, Berry Street, Belfast; L. Scop, 29, Wellington Place, Belfast; R. Garmany, 1, Union Street, Belfast; R. Galt, 91, York Street, Belfast, and I. S. Kearney, 13-15, Bridge Street, Belfast. The registered office is at 53, Chichester Street, Belfast.

Electric Houses for Sutton Coldfield

We learn that owing to the popularity of the electric house which Mr. T. A. Glynn, builder, Great Barr, erected in Welford Road, Sutton Coldfield, last year he is now constructing another of different design in Baker's Lane.

Brazil's Resources and Potentialities

We have received from the Brazilian Consul in London (Aldwych House, London, W.C.2) a copy of a comprehensive publication issued by the Ministry of Foreign Affairs, Commercial Services, dealing with the resources, possibilities and development of Brazil. This contains the fullest details, illustrated by coloured diagrams and photographic reproductions, of all phases of Brazilian economic life. Of particular interest is the section dealing with electricity. Attention is drawn to the immense water power resources of the country, estimated at 35 million h.p., the greater part of which is represented by 4,000 waterfalls in various states. So far only about 900,000 h.p. of this has been harnessed. According to a table included in the volume the number of electric power plants in Brazil rose from 343 in 1920 to 815 in 1932, and the aggregate capacity from 475,652 to 891,465 h.p. It is noted that these particulars are incomplete. Figures are given of the consumption of electricity in the Federal District and in the capital city of Sao Paulo. Those relating to the Federal District show that the sales fluctuated around 300 million kWh between 1928 and 1932. In the latter year they were actually lower than in 1928 owing to a fall in the industrial consumption. In the capital of Sao Paulo the sales rose from about 105 million kWh in 1925 to over 196 millions in 1931. Mention is made of the tendency to electrify the railways and particular reference is made to the contract with the Metropolitan-Vickers Co. for the electrification of the Central Brazilian Railway—the country's principal system.

Very full statistics are given of Brazil's foreign trade in 1931 and 1932. The list of imports includes the following items:—Electric cables, 576,209 kg. (951,022 kg. in 1931); electricity and lighting apparatus, 1,578,433 kg. (1,990,695 kg.); dynamos and generators, 198,947 kg. (225,359 kg.); electric lamps, 62,0 kg. (84,741 kg.); electric motors, 203,812 kg. (323,815 kg.). The classification of imports from Great Britain in 1932 differs from that of the general list and the following items are included:—Electric wires, 244,764 kg.; radio-telephone and telegraph apparatus, 15,664 kg.; electric and illuminating apparatus, 214,157 kg.; dynamos and generators, 18,967 kg.; electric lamps, 1,177 kg.; electric motors, 74,676 kg.; transformers, 172,335 kg.

Belling Publicity

Messrs. Belling & Co. are to assist the trade during the forthcoming season by another extensive advertising campaign in all the principal daily newspapers. Their factory is being extended by 40,000 sq. ft., bringing the total covered-in area up to 180,000 sq. ft., which will enable them to meet the demands for their fires. Their publicity literature includes a new fire catalogue for the season printed in photogravure, in which a number of new designs are introduced. The cooker catalogue gives particulars of new features of cookers Nos. 42 and 43, and it also contains a good deal of information with regard to electric cooking generally as well as some useful recipes.

A Code for American Wholesalers

The *Electrical World* reports that a code for the electrical wholesale trade has been approved by the National Recovery Administration and the General Code Authority, and the local code commission will be appointed in the near future. Under the terms of the code lump-sum bidding is not permitted. Quotations must show the price of each and every item. Neither split shipments nor free deliveries are allowed. Another provision forbids the return of goods after sixty days. Provision is made for limiting cash discounts. None is to be given for payment after the tenth of the month following shipment, and no greater discount is permitted than that allowed by the manufacturer of the product. By a vote of the majority in number and volume, uniform operating hours for electrical wholesalers may be established in any trade area. The code authority will prepare a budget to cover the cost of administration of the code and a basis for an assessment to meet this expense. Non-payment of assessment by a member of the trade will be a violation of the code.

Coalectric Demonstration Home, Torquay

In our last issue we referred to the opening of the Coalectric Demonstration Home, Torquay, which has been organised by

A group outside the Coalectric House, Torquay, on the occasion of the opening ceremony

the members of the Torquay and District E.D.A. Circle. We now reproduce a photograph taken at the opening ceremony, in which our readers will recognise Sir William Ray, M.P., executive chairman of E.D.A., in the centre of the group.

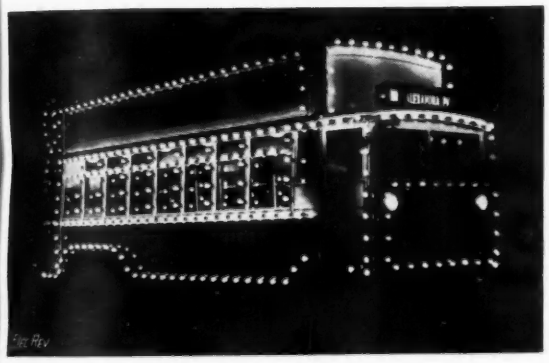
Key Industry Duties

A representation has been made to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for exemption from key industry duties of the following: Sealed cylindrical X-ray tubes with four windows; rectifying valves with an external air-cooling device integral with the valve; micrometers operating by variations of an electric field generated by currents of radio frequency. Any communication relating to this matter should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, within one month from September 6th.

Recent Contracts

The West Midlands Joint Electricity Authority has just placed an order with the British Thomson-Houston Co., Ltd., Rugby, for a 50,000-kW turbo-alternator. This machine is generally a duplicate of that already installed by the B.T.-H. Co. in this generating station, except that the alternator of the new machine is wound for 33,000 V, whereas the existing alternator is wound for 11,000 V, the generated current being transformed up to 33,000 V by means of single-phase transformers. This 33,000-V alternator is claimed to be the largest ever ordered for this voltage. The turbine is of the two-cylinder double-flow type designed for a steam pressure at the stop valve of 375 lb. per sq. in. gauge, 750 deg. F. total temperature. The condensing plant will be manufactured by Messrs. Hick, Hargreaves & Co., Ltd.

Our picture shows a trolley-bus illuminated during the Hastings Carnival with the aid of "Beeantee" strip lighting. A few thousand of these holders and lamps and a large quantity of cable were recently supplied to South Shields, while several of the company's electrical novelties and 20,000 lampholders were included in the illuminations carried out at Worksop. Over 20,000 holders were supplied to Hastings,



A Hastings trolley bus illuminated by means of "Beeantee" strip lighting

together with several electrical novelties which were used in the town's carnival week, and 2,000 holders and electrical novelties have also been supplied to Derby Corporation.

On September 3rd the Belfast Corporation accepted the tender of the Metropolitan-Vickers Electrical Co., Ltd., for a 30,000-kW turbo-alternator set and step-up transformers, the price being £89,847. The set will consist of a two-cylinder turbine of the latest design running at 3,000 r.p.m. with double flow exhaust on the l.p. cylinder, and twin condensers of the "Metrovick" central flow type. The generator will give 30,000-kW at 0.8 power factor m.c.r. The stator frame will be fabricated and a separate motor-driven blower for ventilation is to be supplied which will be put in operation on the higher loads. This is the first extension to the Belfast Corporation power plant to be made since the 18,750-kW Metropolitan-Vickers turbo set was installed in 1928.

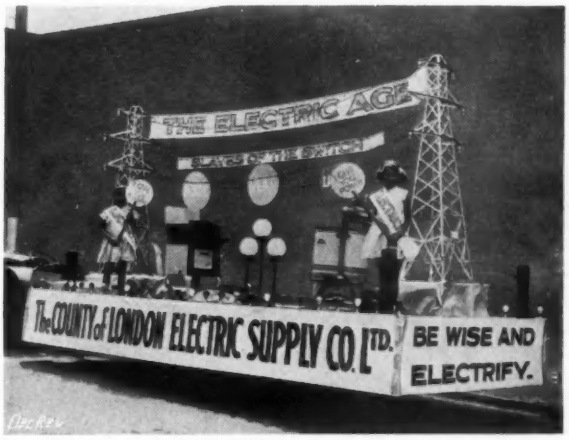
The Sunbeam Motor Car Co., Ltd., has received a third order from the Bournemouth Corporation for thirty-six trolley buses, the value of the order being approximately £80,000. These new buses will be similar to those recently supplied. The chassis is the Sunbeam "M.S.2" six-wheel type, with B.T.-H. regenerative traction equipment. The bodies will be supplied by Park Royal Coachworks, Ltd. These will be of the double-deck type and each vehicle will seat fifty-six passengers.

Messrs. Balfour, Beatty & Co., have secured the contract for the construction of the Kut Barrage in Iraq. The value of the order is over £1,000,000.

Standard Telephones & Cables, Ltd., have obtained an order for a Government wireless station at Roberts Heights, Pretoria, the value of which is approximately £16,000.

New Electricity Showrooms

At a meeting of Turton Urban District Council on September 6th there was criticism regarding the proposed development of electricity by the opening of new showrooms. Councillor Hamer moved back a recommendation sanctioning the expenditure of £2,000 on an electricity showroom and storeroom at Bromley Cross. He said there had been an adjournment of this scheme to enable members to view the site. He characterised the whole proceedings as irregular and not taken with the seriousness which the spending of £2,000 warranted. He also complained that the Council had not got "proper estimates," but merely a surveyor's report. He questioned whether such an expenditure could be justified in any case. Such premises in a residential area like Bromley Cross were not suitable. Councillor Meredith, seconding, agreed that a committee ought not to spend money without supervision by



An attractive tableau entered by the County of London Electric Supply Co., Ltd., in the recent Barking Social Services Carnival

other committees. Councillor G. W. Isherwood (chairman of the Electricity Committee) recalled that since the undertaking started in 1912 the Committee had spent £72,539, of which only £489 had been used for "housing" the undertaking, £66,000 being for mains, transformers, &c., through which the income of the Department was derived. In 1912 they had sixty-nine consumers. To-day there were 1,610. About £20,000 had been spent recently on mains and h.p. services, and it was essential that a showroom should be provided. The scheme was approved by a majority vote.

The Batti-Wallahs' Society

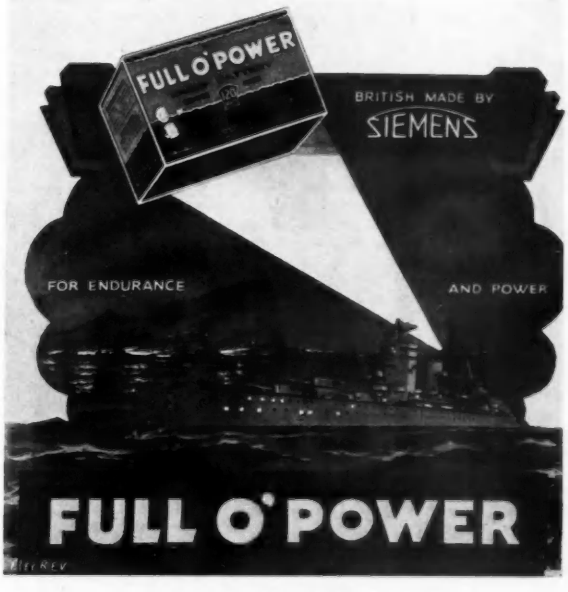
The next session of the Batti-Wallahs' Society will commence on October 17th with a luncheon at the Hotel Metropole, W.C., when the chief guest will be Prof. P. M. S. Blackett, M.A., F.R.S.

Czechoslovakia and Radio Apparatus

The Czechoslovakian Government has issued a decree restricting the importation of radio-telephone and telegraph equipment to such apparatus as is not manufactured in the country.

Siemens Battery Publicity

The accompanying illustration shows a display centrepiece which Siemens Electric Lamps & Supplies, Ltd., is supplying to the trade. It measures 27 in. high by 28 in. wide and 6 in. back to front. It depicts warships anchored off Gibraltar at night with H.M.S. *Nelson* in silhouette in the foreground. A searchlight from one of the warships is directed on to a "Full O'Power" battery. The colour scheme is very effective, especially when the display is illuminated. The necessary fittings and flexible, already wired, are included with the display.



A Siemens battery window display

The company has also prepared a new season's "Full O'Power" battery cut-out and a "Full O'Power" pocket and torch battery showcard.

Cryselco Lamp Publicity

Cryselco, Ltd., has prepared an imposing array of publicity material for the 1934/35 lighting season. This includes a number of showcards with the familiar "Col. Chris. Elco" once again prominent. The one shown in our picture is arranged so that a lamp can be fixed inside the house creating an atmosphere of brightness. This card is made in two sizes, while there is another wall card of similar design, but without provision for a lamp. Two other wall cards in attractive colours draw special attention to the "coiled coil" lamps and automobile lamps. The new catalogue gives full particulars and prices of the various lamps produced by the company, special pages in colour illustrating colour sprayed, natural

One of the new "Cryselco" lamp displays

coloured glass, and daylight blue lamps. The company has also prepared three folders in which space is provided for overprinting the electrical dealer's name and address.

Price Reductions

Messrs. Elliott Brothers (London), Ltd., announce that they have made reductions in the prices of magneto generators listed in sheet P14 of their catalogue of electrically operated speed indicators and recorders for rotating machinery.

Vacuum Cleaner Competition Result

With regard to the competition promoted in June among members of the trade for suggestions for improving trade sales of vacuum cleaners, British Electric Domestic Appliances, Ltd., informs us that in the authorised dealers' and assistants' section the first prize was won by Mr. D. Pruden (Pruden & Pope), Eltham Park, S.E.9, the second prize by Mr. A. G. Rose (A. R. Wilson), Bournemouth, and the third prize by Mr. W. F. Rogers, West Wickham, Kent. The entries in the section devoted to wholesalers and their staffs were rather disappointing, and it was decided to give the actual entrants the choice of either submitting further entries by September 22nd or of having the total prize money divided between them.

Kettering Radio Exhibition

The second annual three-day radio exhibition organised by Kettering Radio and Physical Society commenced on September 13th at the Central Hall, Kettering. Practically every radio dealer in the district has a stand, and full ranges of new season's receivers are on view. Music in the hall and adjoining rooms is provided from a central amplifying plant, each stand being fitted with a point to feed its own speakers. A small hall has been equipped as a cinema in which hourly programmes of talking films are given. A studio run on B.B.C. lines is used for broadcasting competitions daily. X-ray apparatus in charge of a professional operator is seen working, together with other scientific apparatus.

German Lamp Exports

The exports of glow lamps from Germany in the first half of the current year amounted to 15.44 millions, as compared with 15.83 millions in the corresponding period of 1933 and 15.33 millions in 1932, the values having been 4,131,000 marks, 4,699,000 marks, and 4,756,000 marks in the three half years respectively. For the whole of 1933 the number was 43.19 millions of the value of 10.7 million marks, as compared with 40.79 millions in 1932 of the value of 11.50 million marks. The principal customer countries this year have been France, Denmark, Italy, Belgium, Holland and the district of the Saar in the order mentioned. The imports in the first six months of this year numbered about 4 millions of the value of 1.8 million marks, as compared with 4.3 millions in the corresponding period of 1933 and 3.2 millions in 1932. The total imports in 1933 were 9.95 million lamps of a value of 3,897,000 marks, as against 8.99 million lamps and 3,836,000 marks in 1932. The imports in the first half of this year were from Hungary, Austria, Belgium and Holland.

Australian Tariff Board Inquiries

The *Board of Trade Journal* states that the next Australian Tariff Board hearings were to commence on September 10th. The programme of inquiries includes the following items: Condensers under tariff item 180 (L); fixed electrolytic condensers; and electro-surgical units for cutting, coagulation and desiccation.

French Tariff Quota

The Board of Trade has been informed by the French authorities that as from October 1st a separate quota will be allocated to the United Kingdom for electric heating apparatus, including electric stoves (Tariff No. 524 *bis* K.). Such apparatus will not be admitted into France, as from October 1st, unless accompanied by certificates issued by the British Electrical and Allied Manufacturers' Association, to whom the necessary applications should be made.

Bakers' and Confectioners' Exhibition

The Bakers' and Confectioners' Exhibition at the Agricultural Hall, Islington, N., opened on September 8th and continues until to-day (Friday). The main feature of the exhibit of the General Electric Co., Ltd., is a double-deck electric oven of half-sack capacity per deck, on which demonstrations of bread baking are being given daily by the Aerated Bread Co., Ltd. This bread is used in Messrs. Bertram's grill rooms and buffets in the Hall. Smaller ovens are also being shown together with scone plates, doughnut fryers, chocolate dippers, water heaters, &c. Demonstrations of confectionery baking in G.E.C. ovens are being carried out on the stands of Messrs. De Bruyn and Messrs. Crimony. Chocolate dipping is also demonstrated on the G.E.C. stand in the electrically heated, thermostatically controlled dipper which was introduced last year as the first machine of its type to be manufactured in England. It is designed to ensure uniform heating, and to maintain correct temperature by means of a thermostat.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price. September 12th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£205	—
Grade II ... ... ,,	£140	—
Grade III ... ... ,,	£67	—
c Brass (rolled metal 2" to 12" basis)... per lb.	6¾d.	—
c ,, Tubes (solid drawn) ... ... ,,	8¾d. to 9d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn)... ... ,,	9¼d.	—
g ,, Bars (best selected)... ... per ton	£58	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£31	£1 5s. dec.
g ,, ,, Sheets ... ,,	£30 10s. to £30 15s.	10s. to £1 dec.
d ,, ,, Wire Rods ... ,,	£36 10s.	£1 10s. dec.
d ,, ,, H.C. Wire ... per lb.	6¼d.	¼d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6 plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. dec.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 5s.	5s. dec.
g Mercury ... ... per bot.	£11/10/0 to £11/12/6	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & Sheet ,,	10¼d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	7¾d.	¼d. dec.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English) ... ... per ton	£228 5s. to £230 5s.	£1 inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

Malayan Electrical Imports and Exports

Imports of electrical goods and apparatus into Malaya during the first five months of the current year were valued at £138,651, as compared with £103,030 during the corresponding period of 1933. The relative figures for exports were respectively £20,093 and £12,522.

Austrian Import Restrictions

Further additions were made by the Austrian Government, as from August 6th, to the list of articles the importation of which is prohibited except under licence. One of the items in the new list is incandescent electric lamps.

Trade Announcements

In consequence of the increase in their instrument business Messrs. Price & Belsham, Ltd., and the "P. & B." Engineering Co., Ltd., have decided to concentrate the whole of their organisation of this branch at the works of the associated company, the "P. & B." Engineering Co., Ltd. To this end the works have been enlarged and important additions have been made to the plant to facilitate earlier execution of orders. The offices have also been enlarged and as from September

The new premises of the Provincial Incandescent Fittings Co., Ltd., at Shudehill, reference to which was made in our last issue

1st all departments will be removed from Queen Victoria Street to these works. The Sales Department will be under the direction of Mr. E. F. Evenden, A.M.I.E.E., and technical details will continue under the direction of Mr. T. W. Corbin. All correspondence should be addressed to the "P. & B." Engineering Co., Ltd., Tamworth Lane Works, Mitcham, Surrey.

Messrs. John Godden & Co. have opened branch premises at Back Ewens Garage, Lansdowne Road, Bournemouth, and ask for trade lists of fittings, accessories, &c.

The new branch of the Wholesale Fittings Co., Ltd., at 142, King Street, Hammersmith, S.W. (telephone: Riverside 4940), will be opened on September 20th.

Messrs. Alexander Fraser & Co., 132, Renfrew Street, Glasgow, C.2, have been appointed sole agents for Scotland for the Cressall Manufacturing Co.

Mr. G. Hartigan has commenced business at 134/136, Wardour Street, W., as the Hartigan Electrical Co., electrical and ventilating engineers.

Lighting Research (proprietor, Dr. F. T. J. Firminger) is now operating once more, with central offices at 62, Great Russell Street, London, W.C.1.

New Catalogues and Lists

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.—Catalogue No. 694 giving particulars of the comprehensive range of "Efesca-Servis" fires, including full details of a new patent superposed high radiant spiral element. Also catalogue No. 683A of "Efesca" fires, and leaflet No. P.1698 relating to the "Markeith-Servis" electric hot water jug and the "Efesca-Servis" kettle and coffee percolator.

Chas. H. Champion & Co., Ltd., National House, Wardour Street, W.C.—A well-produced booklet containing operating data on ship carbons.

Geo. Bray & Co., Ltd., Leeds.—Catalogue C.23, superseding catalogue C.18, containing illustrated particulars of "Chromalox" immersion heaters.

Charles Clifford & Son, Ltd., Fazeley Street Mills, Birmingham.—A new list of copper and brass tubes, wire rods, sheets, &c., giving tables of weights, gauges, &c. In this new list certain tables have been revised and some new ones introduced.

C.C.A. (Central Cables & Accessories), Ltd., 138, Lever Street, E.C.—Price list 934f of a new range of tough-rubber-sheathed cables.

Tube Products, Ltd., Oldbury, Birmingham.—A leaflet drawing attention to electrically welded steel tubes.

Linolite, Ltd., 96, Victoria Street, S.W.—List No. 34 of Linolite strip lighting.

Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.—A 1934-35 catalogue of radio connections, including interference suppressors, safety devices, pick-ups, &c. Also a booklet entitled "Cutting the Crackle out of Radio," describing the methods for tracing and suppressing electrical interferences with broadcast reception.

Lowa Dimmers, Ltd., Crown Works, Berryman's Lane, Sydenham, S.E.—An illustrated list of dimmers and resistances for all purposes.

R. & A. G. Crossland, Price Street, Birmingham.—A display sheet illustrating with prices "Croslac" industrial lighting reflectors.

Brook Motors, Ltd., Empress Works, Huddersfield.—An illustrated catalogue (List 379) of a.c. electric motors between ¼ and 250 h.p.

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester.—Catalogue section No. 28A.1, illustrated in colour, describing cross-jet oil-blast devices.

Nox Electric Lamp Co., Ltd., Clarence Road, Hunslet, Leeds.—A catalogue of the various types of Nox electric lamps.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.—A general lamp catalogue, in which special attention is drawn to the "coiled-coil" lamp.

Ever Ready Co. (Gt. Britain), Ltd., Hercules Place, Holloway, N.—A folder illustrating the new season's window dressing material, particularly relating to the company's October competition.

Northern Steel & Hardware Co., Ltd., 7, Gartside Street, Manchester.—A catalogue of radio receivers, radiograms and accessories.

Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, W.—A 1934-35 radio components catalogue, giving full details of condensers, resistances, &c.

Dudley & Co., Ltd., 451, Holloway Road, N.—List No. 1525 of advertising calendars for 1935.

Bankruptcy Proceedings

M. Fisher and **J. Fisher,** trading as Marcus Fisher & Co., wireless apparatus manufacturers, 9, Fitzroy Square, W.—The statutory first meeting of creditors was held on September 4th at London Bankruptcy Buildings. The debtors, who also traded as the Paramount Gramophone Co., petitioned the Court with liabilities of approximately £8,000 and assets of £3,225. According to statements made by Marcus Fisher, he began business in 1918 with £60 capital as a gramophone manufacturer. He was joined in partnership by his brother in 1920 and the business progressed until in 1928, their turnover exceeded £30,000 and their capital subsequently increased to £10,000. Afterwards the demand for gramophones declined and they concentrated on the production of wireless apparatus. The failure of the firm is attributed to the sudden decline in the demand for gramophones, bad debts, heavy depreciation in stocks, heavy overhead expenses and keen competition. A resolution was passed for Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., to act as trustee.

F. S. S. Wates, wireless set manufacturer, lately of 184-6, Shaftesbury Avenue, W.C.—The statutory first meeting of creditors was held last week at London Bankruptcy Buildings. The receiving order was made on August 23rd upon the petition of Marconi's Wireless Telegraph Co. and Standard Telephones & Cables, Ltd. The debtor states that he began business in a small way but as it grew, more capital was needed and Wates Radio Co., Ltd., was formed with a nominal capital of £4,000. The company, however, was not a success, and to that fact the debtor attributes his own failure, law costs being a contributory factor. The liabilities are returned at £872 and in the absence of assets the case was left in the hands of the Official Receiver.

A. L. Roberts, 58, Alfreton Road, Nottingham, wireless dealer.—The public examination herein was held at Nottingham on September 6th, when it was disclosed that the ranking liabilities amounted to £270 and the assets were expected to realise £15. Debtor said his failure was due to lack of capital, bad trade, and competition, while he had had difficulty in obtaining stock. The examination was concluded.

F. H. Pountney (Bordesley Electrical Co.), electrical engineer, 162, High Street, Bordesley, Birmingham.—Receiving order made August 31st on a creditor's petition. First meeting September 17th at 159, Great Charles Street, Birmingham. Public examination October 31st at the Court House, Corporation Street, Birmingham.

J. D. Dickinson, wireless and electrical dealer, 671, Chesterfield Road, Sheffield.—Receiving order made September 4th on debtor's own petition.

C. Mellanby, radio engineer, Penlan Street, Pwllheli.—Public examination, October 19th, at the Court House, Portmadoc.

A. J. Gridley (A. J. Gridley & Co.), electrical engineer, 170, Stockwell Road, S.W.—Trustee, Mr. E. Parke, Bankruptcy Buildings, Carey Street, W.C., Official Receiver, released August 21st.

A. W. Creasey (Essex Electrical Storage Co.), Foundry House, Hall Lane, Walton-on-the-Naze.—Trustee, Mr. R. A. Rodgers, Coventry House, South Place, E.C., released August 16th.

H. L. Melvor, electrical engineer, 92, High Street, Ewell.—Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver, released August 17th.

H. Woodland, Junr. (Warrington Radio Hospital), radio engineer, 206, Knutsford Road, Warrington.—Receiving order made August 31st on debtor's own petition. First meeting September 14th at Government Buildings, Victoria Street, Liverpool. Public examination October 5th at the Court House, Palmyra Square, Warrington.

Private Arrangements

F. W. Mason, 357a, Stanley Road, Bootle, electrician.—At a recent meeting of creditors a statement of affairs was submitted showing liabilities of £212, of which £183 was due to the trade and £29 to cash creditors. There were also fully secured creditors for £44, holding security valued at a like amount. The assets were estimated to realise £120, and were subject to preferential claims of £23, leaving net assets of £96 or a deficiency of £116. It was decided that the matter should be dealt with under a deed of assignment already executed in favour of Mr. H. A. Haggis.

Company Liquidations

Sovereign Products, Ltd.—Particulars of claims to the liquidator, Mr. D. A. Jacobs, 74, Newman Street, W., by October 23rd.

Edibell Sound Film Apparatus, Ltd.—Meeting October 9th at Thames House, Queen Street Place, E.C., to receive an account of the winding-up by the liquidator, Mr. E. Norton.

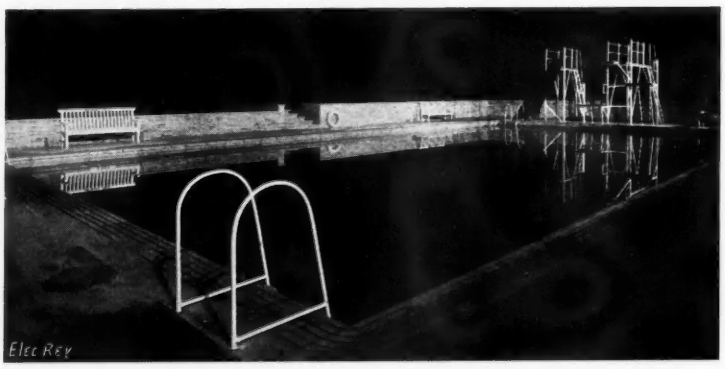
Electricity Supply

Lighting, Domestic, Power

Aberdare.—PARK FLOODLIGHTING.—The park was attractively illuminated for Hospital Week, more than 1,000 lamps and forty-eight floodlights being used. The scheme, which cost about £600, was carried out under the supervision of Mr. W. E. Richardson, electrical engineer to the Council.

Alderley Edge.—TARIFF REDUCTIONS.—The Alderley Edge and Wilmslow Electricity Board has adopted the following reduced scale of charges: Lighting, standard flat rate, 5½d. per kWh; heating and power, 1d. and 1½d. per kWh, according to season, with an alternative rate of a yearly fixed charge of £5 per kW of maximum demand, plus ½d. per kWh; cooking, flat rate of ¾d.; all-in tariff for domestic purposes, fixed charge of 20 per cent. on rateable value of houses up to £60, and 10 per cent. per annum on excess over £60, with a "unit" charge of ¾d.; shop lighting, fixed annual charge of £10 per kW of lighting connected, plus 1d. per kWh; hotel and clubs, first 400 kWh per quarter 5½d. per kWh, next 600 5d., beyond 4d.

Australia.—INQUIRY COMMITTEE.—The N.S.W. Government has appointed a committee to investigate various phases of the electrical industry and to make recommendations. The committee will deal with electrical apparatus and methods to be adopted to safeguard the public. Recommendations will also be made on the generation and distribution of electricity, the Sydney Electricity Department, the operations of county councils, and the manufacture and sale of appliances.



An excellent example of efficient illumination is shown by this night photograph of the Burford Bridge Hotel open-air swimming pool, Box Hill. G.E.C. floodlight projectors and "Osram" lamps are used

Blackburn.—NEW SUB-STATIONS.—Two new kiosk substations are being erected in the Wilpshire area by the Electricity Department (£2,250, including e.h.p. and l.p. mains).

Canada.—TORONTO HYDRO-ELECTRIC SYSTEM.—The annual report on the operation of the Toronto hydro-electric system during 1933 states that the total revenue decreased by $277,245, compared with 1932, and the net cost of power was $180,379 more than it would have been had the 1932 rate from the Ontario Commission been continued. Altogether 818,593,140 kWh was sold (819,926,881 in 1932). Since the middle of 1933 there had been a steady improvement, and the prospects for 1934 were such that the total revenue would probably exceed the 1932 figure.

Carlisle.—REGISTRATION OF CONTRACTORS.—The Electricity Committee has approved a scheme for the registration of electrical-installation contractors with the object of standardising the quality of installations, and from January 1st, 1935, all contracts for the carrying out of electrical installations for the Corporation will be placed only with registered contractors.

RURAL DEVELOPMENT.—The Committee has decided that, pending the decision of the Electricity Commissioners on the Corporation's application for financial assistance in connection with a scheme for the development of electricity supply in rural areas, extensions to Rockcliffe, Great Corby, Warwick, and Castlesteads, included in the scheme, be proceeded with, in view of the proximity of the places to existing feeder points. Application is being made for sanction to borrow £3,370 for mains, sub-stations and transformers in connection with the extensions.

MAINS EXTENSION.—The Electricity Committee has authorised the borough electrical engineer to extend mains at Tyne Street, London Road, Upperby Road, Scalegate Road, and Crosby-on-Eden (£967).

Clyde Valley.—REBATE.—Approximately 70,000 consumers supplied at standard rates by the Clyde Valley Electrical Power Co. and its subsidiary, the Strathclyde Electricity Supply Co., Ltd., have been notified that they are to receive a rebate of 10 per cent. on their accounts for the current year.

East Grinstead.—OFFER REFUSED.—We understand that the Urban District Council has decided not to accept the offer of a London company to buy the electricity undertaking.

Ellesmere Port.—SUPPLY TO COUNCIL HOUSES.—The Mersey Power Co. has started laying mains to supply Council houses at Ellesmere Port with electricity.

Everton (Doncaster).—A supply of electricity will be available at the end of September.

Forres.—INAUGURATION CEREMONY.—The switching on of electric street lighting in Forres on September 3rd was attended by representatives of the Grampian Co., Messrs. Edmundson's, the contractors, and Mr. Maclean, electrical engineer, Inverness, who acted as adviser to the municipality.

France.—HYDRO-ELECTRIC PLANT.—By a recent decree the Compagnie Electrique de la Loire et du Centre has been authorised to construct the necessary works and build a hydro-electric plant at the Monstrol d'Allier waterfall in the Haute Loire Department. Construction of power lines in the east of France is progressing. A line between Sedan and Montmedy has been put into service, with a distributing sub-station at Stenay, and in the Ardennes the principal feeders have been doubled, connections being made with the Belgian power plant at Anvelais.

INCREASED SALES IN PARIS.—The chairman of the Compagnie Parisienne de Distribution d'Electricité, at its last meeting, stated that there had been an increase in the use of electricity for cooking and heating amounting to some 16,000,000 kWh in the last two years.

Fraserburgh (Aberdeenshire).—ARRANGEMENTS FOR A SUPPLY.—It was reported to the Town Council last week that the Consolidated Pneumatic Tool Co. had sold its electric generating plant at Fraserburgh to the Grampian Electricity Supply Co., which was to supply electricity to the burgh from there until the grid system was available. It expected to begin doing so by December next if an agreement were reached with the Council regarding the distribution network in the town. The Council, however, disapproved a proposal of the company to erect overhead lines in a number of streets.

George Town (Penang).—A SATISFACTORY YEAR.—Introduction of "Daylight Saving" by the Government in 1933 was costly to the Electric Supply Department, there being a reduction of 131,584 kWh in the lighting consumption. On the other hand, there were increases in power, heating, cooking and bulk supply, so that the total consumption amounted to 10,500,000 kWh, compared with 10,000,000 in 1932. The net surplus was $79,016 ($64,073 in 1932).

Gloucester.—CATHEDRAL TOWER FLOODLIGHTED.—Mr. F. H. Corson, M.I.E.E., chief engineer and general manager of the Electricity Department, has sent us a photograph of the floodlighted cathedral tower (see page 353). The floodlighting was skilfully carried out by the Department in collaboration with the G.E.C. on the occasion of the Three Choirs' Festival which is held biennially in the city.

India.—MADRAS.—The Legislative Council has granted £15,000 for the current year towards the scheme for supplying electricity from Pykara to Negapatam, Tanjore and other centres in the Tanjore district. The total cost of the scheme is estimated at about £157,000.

THE METTUR SCHEME.—The chief engineer to the Madras Government has submitted estimates amounting to Rs.180 lakhs for developing hydro-electric power from the Mettur reservoir. With an average of 125 ft. head the h.p. developed will be 33,000, while 49,000 h.p. will be generated in an emergency. The plant will consist of four turbines, one of which will be spare. The proposal is to link Mettur with the Pykara scheme, the Mettur plant being for the base and Pykara for the peak loads. The latest information is that the Madras Government has approved the estimates, which have now been submitted to the Secretary of State.

Inverness.—LOAN SANCTION.—The Electricity Committee has obtained sanction to borrow £5,000 for works extensions.

REDUCED CHARGES.—The Committee has reduced the lighting flat rate from 5½d. to 5¼d. per kWh and the power rate from 1¾d. to 1¼d.

Italy.—INCREASED PLANT CAPACITY.—According to *L'Energia Elettrica*, the capacity of the electric power stations in Italy at the end of June last amounted to 4,551,000 kW (3,751,000 kW from hydro-electric plant), compared with 4,510,000 kW at the corresponding date in 1933. The output of electricity in Italy during the six months to June last is estimated at 5,749,562,000 kWh, as compared with 5,172,398,000 in the corresponding six months of last year, an advance of 11.16 per cent. A hydro-electric power station recently completed by the Societa Generale Elettrica Tridentina, at Malga Mare in the Noce Valley of the Italian Trentino district, can be controlled entirely automatically, by hand, or remotely. The station works under a head of 1,895 ft. and is equipped with a turbo-alternator unit of 12,500 kW. It operates in conjunction with a second station, using the same water, 2,420 ft. lower down the valley, at Cogolo. Power is generated at 10 kV, which is stepped up to 135 kV.

Kettering.—PUMPING STATION.—Messrs. Stewarts & Lloyds, Corby, are seeking permission to erect transmission lines from

the Kettering Urban District Council supply to their new Oakley pumping station.

Lanarkshire.—GAS DISPLACED.—The County Council approved the introduction of electric street lighting at Shotts in place of gas (£1,500).

Liverpool.—CLARENCE DOCK.—A special committee of the Corporation recommends that application be made to the Electricity Commissioners for sanction to the extension of the Clarence Dock generating station by the installation of four boilers and the erection of buildings and ancillary works. Each boiler would have a normal evaporative capacity of 200,000 lb. per hour. The estimated cost of the work is £344,300.

London.—REDUCTION OF CHARGES.—The South London Electric Supply Corporation has reduced its charges as follows: "Unit" charge of domestic two-part tariff from ¾d. to ½d.; fixed charge of business two-part tariff from £12 10s. to £10 per annum per kW of installed lighting capacity. A further group has been added to the scale of fixed charges under the domestic two-part tariff, premises with a floor area of not more than 800 sq. ft. being charged at £2 per annum. The new charges will take effect for the last quarter of this year.

Manchester.—BETTER AND CHEAPER LIGHTING.—The annual report of the Highways Committee states that street lighting cost £195,537, as compared with £205,007 in the previous year. The saving was effected in spite of the fact that an additional 21.75 miles of roads and passages were lighted. Although 736 additional electric lamps were erected, of which sixty-three replaced gas lamps, the consumption was less by 42,000 kWh. There are now 29,040 street lamps in the city (21,585 gas and 7,455 electric). Last September twenty-four discharge lamps were erected, and the committee has now authorised the erection of a further forty-nine. The Electricity Committee has obtained sanction to borrow £20,000 for street lighting.

Margate.—WEEK OF ILLUMINATIONS.—A "Week of Illuminations" commenced on Monday. The Dreamland Park pleasure gardens are brilliantly lighted, and about five miles of the sea front is provided with a scheme of coloured illumination.

Meppershall (Beds).—NEW SUPPLY.—A supply of electricity is expected to be available shortly.

Meriden.—CHEAPER ELECTRICITY.—The Birmingham Electric Supply Committee has intimated to the Rural District Council a reduction of ½d. per kWh throughout the scale, together with small reductions in domestic tariff rates, and for the hire of electric cookers, &c.

Motherwell.—LOANS.—The Electricity Committee has recommended the borrowing of £7,000 for the purchase of meters and £750 for extending the office and workshop accommodation in Watson Street.

Pontardawe.—LOAN NOT NEEDED.—The Electricity Committee reported that it would not be necessary to exercise the sanction obtained from the Electricity Commissioners in August, 1932, to borrow £2,000 for wiring installations, the financing having been made out of revenue. The sanction is being returned to the Commissioners for cancellation.

Rugby.—OVERHEAD LINES.—The Leicestershire & Warwickshire Electric Power Co. proposes to erect overhead cables at Street Ashton and Pailton.

Ruskington.—The Mid-Lincs Electric Supply Co., Ltd., is to purchase the capital of the Ruskington Electric Supply Co., Ltd., for 10s. per £1 share, on condition that the shareholders become users of their electricity. The Mid-Lincs Co.'s tender for public lighting has been accepted.

Sheffield.—RECENT SANCTIONS.—The Electricity Committee has obtained sanction to borrow £94,991 for main transmission lines and e.h.p. feeder mains, and £18,260 for rectifier equipment for traction supply. The Committee has authorised the extension of ordinary mains at a total estimated cost of £7,406.

PROPOSED SUB-STATION.—The Committee has purchased land at a proposed new road near Springfield Road, Ecclesall Grange Estate, for the erection of a sub-station.

Stretford.—BOARD'S FINANCES.—The gross income of the Stretford and District Electricity Board (electrical engineer, Mr. T. A. Kerr, M.I.E.E.) during the year ended March 31st last was £310,834, compared with £260,184 in 1932-33. Working expenses amounted to £191,689 (£177,269), and there was a net profit of £17,073 (in 1932-33 there was a deficiency of £8,262). Total sales amounted to 94 million kWh (75 million).

Torquay.—A SELECTED STATION.—The Electricity Committee reported to the Council that the Central Electricity Board had indicated that, after an exhaustive study of the South-west England and South Wales area, it had concluded that further use should be made of certain power stations which were not included in the original scheme, and that Torquay was one of these.

West Midlands.—J.E.A. ACCOUNTS.—The 1933-34 revenue account for bulk supply shows income of £466,305 and expenditure amounting to £471,942 (£190,551 for loan charges, &c.), leaving a deficit of £5,637. The total income of £27,983 from the distribution area is short of the expenditure by £3,618. During the year 275,518,391 kWh (228,581,236) was sold in bulk supply and 4,347,828 kWh (3,600,914) in the distribution area, the 1933-34 figures in the latter case excluding a supply to Shrewsbury Corporation.

The floodlighted tower of Gloucester Cathedral

The capacity of bulk-supply plant at the end of the year was 131,500 kW (97,100) and the estimated connected load in the distribution area 8,760 kW (3,000).

Wellingborough.—OVERHEAD-LINE INQUIRY.—A public inquiry was held at Wellingborough on September 6th into the proposal of the Wellingborough Electric Supply Co. to erect overhead lines in Brickhill Road, Harrowden Road, and Nest Lane, Wellingborough. The inspector stated that there was considerable evidence of imminent developments in two of the roads and the cases merited further explanation on the part of the company.

Walthamstow.—IMPROVED STREET LIGHTING.—An interesting lighting installation with Siemens "Sieray" electric discharge lamps has been completed at Wadham Road by the Electricity Department. From the illustration which we reproduce below it is seen that, in spite of the existence of the line of trees, the road surface is brilliantly lighted and there is practically no shadow whatever in the case of the new lighting. The lamps are in type DA4 lanterns, the mounting height of the light source being 23 ft.

The new lighting at Wadham Road, Walthamstow (left) and that which it superseded

Worksop.—NEW GENERATING STATION?—Worksop Town Council last week approved the recommendation of the Electricity Committee that, in view of the failure of the Notts and Derby Electric Power Co. to offer a supply from the Central Electricity Board at terms which could be accepted and which would result in the industrial development of the borough, application be made to the Electricity Commissioners for sanction to erect a generating station at an estimated capital cost of £105,000.

ILLUMINATIONS.—For the illuminations in connection with the Worksop Shopping Week and Carnival 15,000 electric lamps were used. Some of the principal buildings in the town were floodlighted.

Traction

Algeria.—INCREASED TRAFFIC.—Since the electrically worked Duvivier-Oued Kheberit section of the Algerian State Railways was extended to Bone the tonnage hauled has increased considerably. In 1932 743,420 tons were carried, and in 1933 940,880 tons. Over the mountain division electrification has reduced the journey time by 40 per cent., and on the more level portions by 25-30 per cent.

Burnley.—JOINT COMMITTEE'S REPORT.—In the first annual report of the Burnley, Colne and Nelson Joint Transport Committee, to March 31st last, Mr. C. H. Stafford, general manager, expresses the view that the formation of the Committee had been amply justified. During the year steps were taken to improve the transport facilities and to standardise fares, while from the financial standpoint there were gross revenues of £111,251 (trams) and £138,856 (buses), working expenses being £88,299 (trams) and £122,283 (buses). After adding £933 from the sale of trams and bank interest and deducting £10,192 interest, &c., charges, there were net revenues of £22,167 (trams) and £8,098 (buses).

Leeds.—REPLACEMENT OF TRAMWAYS.—The City Council has given notice that it has applied to the Traffic Commissioners (Yorkshire area) for permission to run motor buses in the place of trams on routes between Leeds and Morley.

Leicester.—TROLLEY- OR OIL-BUSES?—Mr. J. Mould, electrical engineer and manager, in a report to the Electricity Committee, estimates that trolley-buses could provide a similar service to that given by tramcars in 1932-33 at £45,000 less than in the case of oil-buses. He also notes that as the oil-bus comes into more general use the cost of oil will probably increase, whereas the cost of electricity supplied by the Corporation's own undertaking would certainly not rise.

Liverpool.—CO-ORDINATION PROPOSAL.—The Tramways Committee proposes to call a conference of local authorities and transport bodies to consider the question of co-ordination.

London.—TROLLEY-BUSES.—It is stated in the *Morning Post* that the London Passenger Transport Board is testing two types of trolley-buses in connection with the proposed replacement of tramcars by this type of vehicle on certain routes. The vehicles are a six-wheeled 73-seater and a four-wheeled 60-seater.

New York.—TRAMS TO GO.—The "Green Car" tramway services which traverse the Broadway and other principal streets are to be abandoned, according to the *Morning Post*.

South Africa.—BLOEMFONTEIN TRANSPORT SYSTEM.—Mr. C. J. Spencer, of London, who investigated the Bloemfontein municipal transport system during his recent visit to South Africa, recommends the abandonment of the trolley-bus system and the substitution of heavy-oil omnibuses. His report, in effect, endorses that issued in June by Mr. R. Macaulay, the city electrical engineer, and Mr. D. A. Thomson, a former chairman of the Tramways Committee.

Traffic Signals.—On September 6th an automatic traffic-control system was switched on at the Angel, Islington, London, N. In all there are twenty-two light standards, controlling seven roads, and eight policemen are released from point duty.

Sheffield City Council is to erect automatic traffic signals at the junction of Wood Street and Langsett Road.

Cardiff Watch Committee is to install traffic signals (£1,000).

In its annual report the Manchester Highways Committee states that twenty-three additional sets of automatic traffic-control signals have been fixed, of which three are vehicle-actuated. One set of pedestrian-operated signals has been installed.

Nairn Town Council is to proceed with the installation of traffic signals at Commerce Street, High Street, and Lossie Wynd, Nairn.

Communications

Australia.—TELEPHONE DEVELOPMENT.—The Federal Parliament has passed a Bill providing for a loan of £1,000,000, which will be used for telephone development. Of this sum £785,000 is to be spent on exchanges and £215,000 on additional trunk telephone lines.

Germany.—TELEVISION AND TELEPHONE.—According to the *D.A.Z.*, the Ministry of Posts is considering the establishment of combined television and telephone services between the most important cities in the country. The call boxes would contain both types of apparatus, so that each speaker would be able to see an image of the other on a screen.

Great Britain.—AUTOMATIC OPERATION.—According to *The Times*, the new automatic telephone exchange at Highbury Grove, N., was to be opened yesterday (Thursday). The exchange takes over more than 1,000 subscribers at present attached to the North and Canonbury hand-operated exchanges.

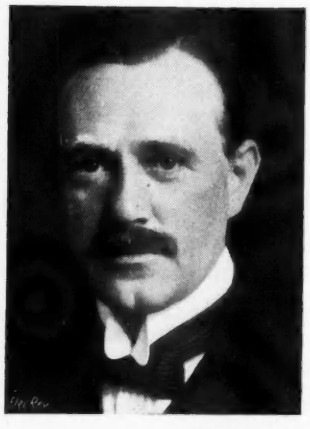
New Zealand.—EARTHQUAKE PROBLEM.—A correspondent of *World-Radio* states that the problem of maintaining wireless communication during and immediately after earthquakes is receiving attention. It is proposed that there should be a more or less complete system of radio links to prevent districts from being completely isolated, as has happened in the past. Such a system of wireless communication would require, for purposes of power, to be independent of the general electricity services, and the problem is not a simple one. Experiments are being made with storage batteries and with dry cells, while petrol generators are also being tested.

South Africa.—NEW WIRELESS STATION.—Standard Telephones & Cables have obtained the contract for the supply of material and also for the erection of a powerful wireless station at Roberts Heights (near Pretoria), the headquarters of the South African Defence Force. The station, which will begin to operate in October, 1935, will be used by the Defence Force for wireless communication with the airways service and for Press traffic.—*Reuter*.

An International Scientific Radio Conference

ON Tuesday last radio scientists from many countries met at the Royal Society's Rooms in London for the opening of a conference of the International Scientific Radio Union. The present conference follows those held in Washington in 1927, Brussels, 1928, and Copenhagen, 1931.

The purpose of the Union is to discuss those radio researches which depend for their success on international co-operation, and to facilitate the establishment of common methods of measurement, as well as the comparison and standardisation of measuring instruments. Besides discussing such matters as precise methods of measuring the frequency of transmitting stations, the measurement of signal strength and the production of ultra-short waves below 20 cm., the conference will consider many problems involved in the travel of wireless waves, including the determination of the composition of the upper atmosphere, the height of the Kennelly-Heaviside and Appleton layers, fading, &c. Attention will also be devoted to ways in which amateurs can help in such work.



[*Elliott & Fry*
Dr. W. H. Eccles

In thirteen months during the years 1932 and 1933 many nations co-operated in maintaining a continuous watch, mainly in the Arctic region, on magnetic, auroral, meteorological and atmospheric electrical phenomena. This period was known as an International Polar Year. In view of the fact that much reliable meteorological data were thus to become available, a number of radio observations was also arranged. Under the auspices of the Department of Scientific and Industrial Research, a British Radio Expedition was sent out to Tromsö in the Arctic Circle under the leadership of Professor Appleton. The result of this and expeditions by other nations will be discussed and compared at the conference.

Discussions will also take place on the so-called "long delay" echoes, which seem to indicate that wireless signals sent out from this planet may at times wander many million of miles into space before returning to earth. The study of lightning phenomena and atmospherics will also be considered.

In addition to the discussions in the sessions of the conference, the British National Committee for Radio-Telegraphy (the chairman of which is Professor E. V. Appleton and the secretary Professor S. Chapman, of the Imperial College) has arranged a series of technical visits for the delegates. For example, they will have an opportunity of seeing the work of the Radio Department of the National Physical Laboratory, both at Teddington and at the Radio Research Station, Slough, and will visit the Rugby and Baldock stations of the Post Office. The conference is also being entertained by the B.B.C. and by the Royal Institution, and a visit to Cambridge also has been arranged. Finally on September 18th there is to be a Government dinner at Grosvenor House at which the Postmaster-General, Sir Kingsley Wood, will preside.

Professor Kennelly, of the United States, whose name was linked with that of Heaviside in the christening of the Kennelly-Heaviside layer, was to have presided at the conference, but he was prevented by doctor's orders from travelling to Europe. Dr. W. H. Eccles will accordingly act as president for the present meeting.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—Victorian Railways. October 17th. Selector telephone equipment consisting of a control office with thirteen radiating lines. (A.Y. 12532.)*

State Electricity Commission. October 29th. Twelve automatic induction voltage regulators of various ratings. (A.Y. 12611.)*

TOWNSVILLE.—October 11th. One 1,000-kW self-contained turbo-alternator unit complete with exciter auxiliary plant and all necessary instruments and fittings. (A.Y. 12535.)*

SYDNEY.—December 3rd. New South Wales Public Works Department. Hydro-electric plant in connection with the Burrinjuck water power development scheme. (A.Y. 12617.)*

Beckenham.—September 24th. U.D.C. House service meters. (September 7th.)

Birmingham.—October 2nd. Electric Supply Department. H.p. and p.i. cables during a period of twelve months ending October 31st, 1935. (September 7th.)

Bristol.—September 19th. Corporation. Six e.h.p. transformer pillars. Specifications from Chief Engineer, Electricity Offices, Colston Avenue (deposit £1 1s.).

Cardiff.—September 18th. Electricity Department. Supply and laying of e.h.p. and l.p. cables and supply and erection of transformer kiosks. (September 7th.)

Carlisle.—September 29th. Electricity Department. Meters for the ensuing year. (See this issue.)

Chichester.—October 8th. City Council. Cables, switchgear, kiosks, outdoor sub-stations, &c., for the development of the south-western portion of the Council's area. (See this issue.)

Douglas (I. of M).—October 17th. Electricity Department. One 3,750-kW turbo-alternator and one 40,000-lb. water-tube boiler. (See this issue.)

Ealing.—September 24th. Electricity Department. Cables, including laying and jointing. (See this issue.)

Ecuador.—QUITO.—November 13th. Municipality. Electric power plant (3,000 h.p.), street-lighting equipment, &c. (A.Y. 12589.)*

Egypt.—CAIRO.—October 18th. Ministry of Public Works. Evacuating and dewatering pumps with electric motors, switchgear, main electric motors, accessories, switchgear and accessories, main and auxiliary transformers and accessories, oil for transformers and circuit-breakers, station electric lighting and equipment, and filter plant and accessories. (G.Y. 14151.)*

November 3rd. Electrical material in connection with the installation of overhead and underground networks at Barrages. (A.Y. 12591.)*

GIZA.—December 8th. Ministry of Public Instruction. Apparatus for the electrical laboratory of the Royal School of Engineering. (A.Y. 12577.)*

Exminster.—September 21st. Devon Mental Hospital Committee. Six months' supply from October 2nd of electric lamps, &c. Tenders from C. Masters, clerk to the Hospital.

Greece.—October 17th. Hellenic Electric Railway Co. Eleven electric coaches for the Piraeus-Perama line. (G.Y. 14239.)*

Hastings.—September 28th. Corporation. Converting to electric drive the time and striking mechanism of the clock in the Albert Memorial. (September 7th.)

Hemel Hempstead.—September 17th. Rural District Council. Electrically driven borehole pump. Specifications from Howard Humphreys & Sons, 17, Victoria Street, Westminster, S.W.1 (deposit £1 1s.).

Hull.—September 24th. Education Committee. Electrical installation at Ainthorpe Grove schools. Particulars from City Architect, Guildhall (deposit £1 1s.).

India.—DELHI.—September 21st. Bombay, Baroda and Central India Railway Co. 400-kW heavy oil engine driven generating set. (September 7th.)

September 28th. Plates, separators, &c., for train-lighting accumulators. (September 7th.)

SIMLA.—October 10th. Stores Department. Electricity meters for one year. (A.Y. 12618.)*

Kirkcaldy (Fife).—September 20th. Town Council. Various works, including electrical, at Forth Park Maternity Hospital. Schedules from W. Williamson and Hubbard, architects (deposit £2 2s.); tenders to Town Clerk.

Lanark.—September 18th. County Council. Various works, including electric lighting, for seventy-two houses. Schedules from P. C. Smith, county housing and town planning engineer, 13, Clydesdale Street, Hamilton.

London.—DEPTFORD.—September 19th. Borough Council. Vehicle-actuated traffic signals at Lewisham High Road and New Cross Road. Particulars from Borough Engineer, Town Hall.

EDMONTON.—September 15th. Urban District Council. Automatic traffic signals. Particulars from borough engineer and surveyor (deposit £2 2s.).

GREAT WESTERN RAILWAY.—September 27th. Telegraph instruments, electrical apparatus, &c. (See this issue.)

New Mills.—September 19th. Electricity Department. Cables, equipment and poles. (September 7th.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. October 10th. Telephone cable (A.Y. 12554.)* (A.Y. 12555.)*

November 1st. Dynamo sets. (A.Y. 12592.)*

Public Works Department. October 16th. Three 110-kV liquid fuses with fittings and three spare fuses. (A.Y. 12593.)*

Scarborough.—September 19th. Electricity Department. E.h.p. cable and sub-station kiosk. (See this issue.)

Sheffield.—September 18th. Electricity Department. Cooling towers and civil and constructional engineering work at Blackburn Meadows generating station, and civil and constructional engineering work at Neepsend power station. (August 3rd.)

Southend-on-Sea.—September 30th. Corporation. X-ray equipment for hospital. Specifications from Medical Officer of Health, Public Health Offices.

Tasmania.—HOBART.—October 1st. Municipal Tramways. Electric motors and control and air-brake equipment for two tramcars. (G.Y. 14195.)*

Hydro-electric Commission. October 22nd. Four transformers for the Rosebery sub-station. (A.Y. 12584.)*

Uruguay.—MONTEVIDEO.—State Electricity Supply and Telephone Administration. October 19th. Transformer sub-station equipments. (A.Y. 12602.)*

October 29th. L.c. v.i.r. cables of various types. (A.Y. 12601.)*

October 31st. Knife, rotary and pear-shaped switches. (A.Y. 12600.)*

Walthamstow.—September 28th. Electricity Department. E.h.p. and l.p. a.c. switchgear. (September 7th.)

Warrington.—September 18th. Electricity Department. Twelve months' supply of e.h.p. and l.p. paper-insulated and lead-covered (and other) cables, earthenware conduits, cable protector slabs and tiles. (August 31st.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35 Old Queen Street, S.W.1.

Contracts Closed

Birkenhead.—Electricity Committee. Accepted. Installations in houses under assisted wiring scheme.—Economic Electric Co. (£117); Park Electric Co. (£341).

Blackpool.—Electricity Committee. Accepted. Street-lighting lanterns.—General Electric Co., Ltd.

Bootle.—Highways Committee. Accepted. Armoured cable (£162).—Liverpool Electric Cable Co., Ltd.

Watch Committee. Accepted. Electrical work at central police station (£153).—Central Electrical Co.

Denny.—Stirling County Education Committee. Accepted. Electrical work at Roman Catholic school.—E. Masson.

Doncaster.—Corporation. Accepted. H.p. switchgear for sub-stations (£773).—Crompton Parkinson, Ltd. Transformers (£420).—Electric Construction Co., Ltd.

Ennerdale.—Rural Council. Accepted. Wiring seventy-eight houses at Moresby Park (£476).—A. Tait.

Inverness.—Electricity Committee. Recommended. Second-hand meters.—Victa Electrical Co. Cables for Drummond Crescent housing scheme.—Pirelli-General Cable Works, Ltd.

Manchester.—Highways Committee. Accepted. Traffic signals: Chorlton—Automatic Electric Co., Ltd.; Withington—Forest City Electric Co., Ltd. Portable traffic signal equipment.—Chance Bros & Co., Ltd.

Electricity Committee. Accepted. Extension of contract to include two additional complete boiler units at Stuart Street power station.—J. Thompson Water Tube Boilers, Ltd.

Education Committee. Accepted. Electrical installation at Crowcroft school.—P. Campbell Stevens & Co. Renewing electrical fittings at Didsbury school.—A. E. Sudlow & Co., Ltd.

Newbury.—Guardians Committee. Accepted. Electric lighting at Bradfield Institution (£349).—E. H. Felgate.

Newport (I.o.W.).—Water Committee. Recommended. Electric pumps (£534).—Mather & Platt, Ltd.

Sheffield.—Transport Committee. Accepted. Electric clocks (£395).—C. E. Needham & Bros., Ltd. Fifteen automatic point controllers (£900).—Forest City Electric Co., Ltd.

This shows Lt.-Col. the Hon. A. C. Murray (left), chairman of Radiovisor Parent, Ltd., demonstrating the company's new street-lighting control apparatus (see page 340) to Mr. O. W. S. Watson, of the Ministry of Transport (right). In the centre is Mr. J. W. E. Avern, managing director of Radiovisor Parent, Ltd.

Notes

The Manchester Athenæum Electrical Club

The Manchester Athenæum Electrical Club enters its winter session on September 21st. Since last season the Electrical Association for Women has taken up its headquarters at the Manchester Athenæum and the two clubs will hold a joint luncheon once a month. The first will be on September 21st, when Mr. H. M. Dowsett, M.I.E.E., research manager of Marconi's Wireless Telegraph Co., Ltd., will speak on "Television." If any members of the electrical or allied trades would like to attend they should make application to Mr. E. Golland, the hon. secretary of the Club. A syllabus of the speakers for the whole season will be obtainable from Mr. Golland in a few days.

Left: A finishing touch by a stork to a telegraph pole. Right: A board on the Arctic Circle

Electricity Generated in August

According to official returns received by the Electricity Commissioners, 1,059 million kWh of electricity was generated by authorised undertakers in Great Britain during August, compared with the revised figure of 928 million kWh in the same month last year, representing an increase of 131 million kWh, or 14.1 per cent. The number of working days in each case was twenty-six.

During the first eight months of this year the total amount of electricity generated by authorised undertakers was 9,731 million kWh, compared with the revised figure of 8,336 million kWh for the same period of last year, an increase of 16.7 per cent. The following table gives the figures for each month this year and the corresponding month of last year:—

	1933. kWh. (millions).	1934. kWh. (millions).	Inc. per cent.
January	1,336	1,536	14.8
February	1,151	1,343	16.5
March	1,160	1,390	19.6
April	952	1,187	24.5
May	1,005	1,125	11.9
June	885	1,049	18.5
July	913	1,042	14.1
August	928	1,059	14.1

International Steam Tables Conference

The technical sessions of the International Steam Tables Conference which opens on September 17th at Washington will be held at Washington, Boston, and New York. The objects of the present Conference will be to compare experimental results obtained since 1930, to reduce existing tolerances in the skeleton steam tables and generally to prepare for the final tabulation of results. The experimental work undertaken in Czechoslovakia has been completed, and in Great Britain, Germany, and the United States the experimental work is very nearly finished. The next Conference will probably be held in Prague in twelve months' time. The British delegation consists of Mr. George Callendar, Mr. A. Egerton, F.R.S., Mr. H. L. Guy and Mr. I. V. Robinson. The German delegation includes Dr. Henning, Dr. Hausen, and Herr Koch. Among those who will attend the Conference in the United States will be Mr. George Orrok, Mr. Harvey Davis, Professor Keenan, Professor Keyes, Dr. Dickenson, and Dr. Osborne. Professor Havlicek, of Czechoslovakia, is unable to attend the Conference.

Educational

The next session of the Sir John Cass Technical Institute will begin on September 24th. The syllabus of classes can be obtained from Mr. G. Patchin, the principal, Jewry Street, E.C. The Institute building has been extended by the addition of a new wing, which will be formally inaugurated by the Earl of Athlone on October 10th. The increased accommodation will enable new laboratories to be provided.

The calendar of the Technical College, Brighton, the 1934-35 session of which commences next week, contains full information regarding full-time and part-time day and evening courses, which include electrical engineering. Particulars of the electrical engineering classes can be obtained from Mr. E. Hughes, at the Electrical Engineering Department of the College.

The Borough Polytechnic commences its session in electrical engineering and physics on September 24th. Enrolment nights are September 17th, 19th and 21st. Courses of special lectures on "High Voltage Engineering" and "Television" will be given.

The first term of the University College, London (Faculty of Engineering), commences on October 1st. Intending students should apply to the secretary.

A European Tour

Mr. John Ellison, one of the directors of George Ellison, Ltd., has just returned from a business tour of Europe in the course of which he covered 8,000 miles in his car. In five weeks he visited Norway, Sweden, Finland, Estonia, Latvia, Lithuania, East Prussia, Poland, Czechoslovakia, Hungary, Austria, Switzerland and France. He states that he found the German electrical industry, with the exception of the radio branch, to be very depressed. He thinks that Estonia appears to offer exceptional marketing possibilities to English exporters. During his trip Mr. Ellison took a number of photographs two of which we reproduce herewith. One shows the preference of a stork for a telegraph pole as a site for her nest rather than the nearby tree. The other speaks for itself.

The A.S.E.E. Programme

The 1934-35 Session of the Association of Supervising Electrical Engineers will commence on October 16th when Mr. J. M. Kennedy will deliver his presidential address. Meetings for the remainder of the session include the following:—November 14th: "Communication, Protection and Supervisory Control Systems for Electric Power Networks," by Mr. N. C. Smart, at Magnet House, Kingsway, W.C. November 20th: "The Tenth Edition of the I.E.E. Regulations for the Electrical Equipment of Buildings," by Mr. W. Lang. December 18th: "Earthing for Protection," by Mr. T. C. Gilbert. January 15th: "The Technical Expert in the Witness Box," by Mr. A. Murray Coombs. February 19th: "Modern Factory Equipment and Maintenance," by Mr. J. H. Boyd. March 19th: "Luminous Discharge Tubes and their Development," by Capt. C. Higgins. April 23rd: "The Importance of the Home Installation," by Miss C. Haslett. All meetings, with the exception of the one on November 14th, will be held at the Lighting Service Bureau, 2, Savoy Hill, W.C. The annual dinner and reunion will be held on February 16th at the Trocadero, Piccadilly Circus, W. In addition to the above there will be visits to works and social gatherings.

Worcester a Smokeless City

In his annual report on the public health of Worcester, the Medical Officer (Dr. A. J. B. Griffin) refers appreciatively to the progressive use of electrical power in industry, and says that Worcester is relatively a smokeless city. Nearly 21,000 h.p. was being employed in industrial processes, and the use of electricity in the homes was increasing, taking the place of coal. No action had been necessary under the Smoke Abatement bylaws.

The "Model Engineer" Exhibition

Powerful miniature locomotives, a representation of the B.B.C. concert organ and a handsome master clock are among the interesting electrical exhibits at this year's "Model Engineer" Exhibition which opened at the Royal Horticultural Hall, S.W., last week and concludes to-morrow. Among the trade displays there is an excellent collection of apparatus on the stand of the Grafton Electric Co., London, W.1, including many small motors, dynamos, &c., a new aerator suitable for aquaria, and an electric safety razor working from a flash-lamp battery. Prominence is given to the recently introduced "Grelco" multi-plug two-way adaptors. Sample display stands include a complete range of meters for switchboard and pocket use, boat motors, super-sensitive microphones, &c., exhibited by the Economic Electric Co., Twickenham, and a portable charger shown by F. C. Heayberd & Co.

Makers' Names Wanted

FLINTS spotlights and colour screens.
Electrically heated apple press for cider making.
Electric butter knife.
DIEHL motors.
M.B.F.R. (monogram) motor starters.
GENRISTO soldering iron.
SALVA HYDROLUX batteries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. W. A. Royle, borough electrical engineer at Blackburn, has been recommended by the Sunderland Corporation Electricity Committee for the appointment of electrical engineer and manager at Sunderland.

Mr. J. V. Brittain, who has for nearly five years been head of the Electrical Engineering Department of the Municipal Technical School at the Gamble Institute, St. Helens, has taken up an appointment as assistant to the Principal of the South-East London Technical Institute. Mr. Brittain has been a frequent contributor to the ELECTRICAL REVIEW.

Mr. J. V. Brittain

Mr. G. T. Redgment, A.M.I.E.E., consulting engineer, is removing tomorrow (Saturday) to 50, Prince of Wales Road, Norwich.

Mr. R. C. W. Joyce, whose appointment in the Mains Department of the Westminster Electric Supply Corporation, Ltd., was recorded in our last issue, was for two years on the staff of Messrs. Grierson, Ltd., not Ericsson Telephones, Ltd., as we incorrectly stated.

Mr. G. A. Robertson, M.Sc., has been appointed assistant borough electrical engineer to the Preston Corporation at a salary of £700, rising to £800, per annum.

Mr. J. W. Jones has been appointed an Electrical Inspector of Factories by the Home Secretary.

Mr. Andrew S. Tait is resigning his position in Montreal with the Packard Electric Co., Ltd., to become general manager of the English Electric Co., Ltd., and vice-president and general manager of the company's subsidiary, the Canadian Crocker-Wheeler Co., Ltd. Mr. Tait is a native of Bath, and went to Canada in 1895.

Mr. P. A. Ward informs us that he is no longer connected with Messrs. Courtney Russell & Co., Ltd., and has commenced business as an electric lighting fitting designer and manufacturer, under the style of Avery Ward & Co., at 16, Fitzroy Street, London, W.1.

In our issue of August 24th we recorded the appointment of **Mr. C. G. Seeley** as assistant manager, London district, to the British Thomson-Houston Co., Ltd. We now have pleasure in reproducing his portrait herewith.

[*Basil, London*

Mr. C. G. Seeley

N.E. Coast Institution Awards.—At a recent meeting of the Council of the North-East Coast Institution of Engineers and Shipbuilders it was decided to make the following awards: Engineering Gold Medal: "The Possibilities of Applying Improvements Effected in Modern Land Power Plant to Ship-propelling Machinery," by Messrs. W. T. Bottomley, E. W. Corlett and F. Piercy. Shipbuilding Gold Medal: "The Electric-welded ship *Peter G. Campbell*," by Mr. N. M. Hunter. Institution Scholarship: Mr. Mallinson Powley. Grants of £30 each have been made to two other candidates for the scholarship, namely, Messrs. R. C. Sumner and P. Carter. The scholarship of Mr. W. L. Stewart, the 1933 scholar, has been continued for a further year, and a grant of £50 has been made to Mr. J. C. Matthew (who received a similar grant last year). The Harroway Scholarship, awarded to Mr. G. G. Harforth last year, is being continued for the 1934-5 session. The Thomas Fenwick Reed Medal is awarded this session to Mr. J. C. Boyd. The following awards have been made from the Graduate Award Fund for papers read before the Graduate Section: Mr. W. Pratt for a paper on "Thermocouples" (£3 10s.); Mr. C. E. Clouston for a paper on "Electric Cargo Winches" (£2 10s.); Mr. D. Tagg for a paper on "Superheating" (£2 10s.); Mr. K. Fairbairn for a paper on "The Hydraulic Reaction Turbine" (£2); Mr. J. Smith for a paper on "Coal Mining with Electrically Driven Machinery" (£1 5s.); and Mr. J. L. Hobson for a paper on "Safety in Factories" (£1 5s.).

Mr. J. Pilling, B.Sc., a technical assistant with the Burnley Corporation Electricity Department, has recently been appointed lecturer in electrical technology and power at Burnley Technical College.

Mr. Pilling has been associated with Burnley College as electrical engineering student and part-time lecturer, and holds a first-class City and Guilds certificate in electrical engineering. He has been with the Burnley Electricity Department for nine years.

Mr. J. Pilling

Mr. E. E. Pierce, who has been appointed manager and chief engineer of the British Power Railway Signal Co., Ltd., has been associated with the company for twelve years, and for several years has held the position of chief engineer to the company.

Mr. A. Pollitt, the chief constructional engineer of the London Power Co., Ltd., who was seriously injured in a motor car accident about three weeks ago, is, we are glad to hear, making satisfactory progress towards recovery.

Obituary

Mr. J. R. Johnson.—The *Electrical World* reports the death of Mr. Joshua R. Johnson, "who was associated with the pioneer development of the Thomson-Houston Co. at Lynn, Massachusetts, prior to the organisation of the General Electric Company." Mr. Johnson, who was seventy-three years of age, was born in England.

Dr. Ing. F. Schrotte.—The death recently occurred in Berlin, at the age of sixty, of Dr. Ing. Franz Schrotte, who for many years had been associated with the Siemens & Halske and Siemens-Schuckert concerns. The deceased was a leading German authority on excess voltage protection, h.p. transmission, and high-capacity switchgear.

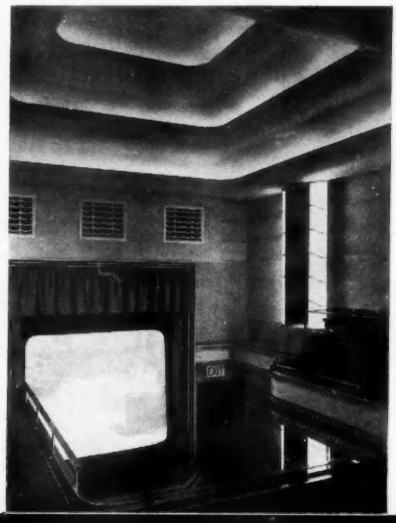
Mr. J. T. Mould.—We regret to record the death of Mr. John T. Mould, which occurred on September 6th, at the age of seventy-three years. Mr. Mould was a director of the Igranic Electric Co., Ltd. He received his early training with the Lancashire & Yorkshire Railway Co. at Manchester, and in 1891 entered the employ of Messrs. J. H. Pickup & Co. as their Yorkshire sales engineer. In 1899 he joined the electrical department of the Sturtevant Engineering Co., and, with the late Mr. A. H. Adams, commenced to develop the sale of electric motor-controlling apparatus. In 1905 Mr. Adams formed the Adams Manufacturing Co., Ltd., and built at Bedford the nucleus of the present Igranic factory. The electrical switchgear business was acquired from the Sturtevant Engineering Co., and Mr. Mould was appointed sales engineer. The Igranic Electric Co. was formed to take over the Adams Manufacturing Co. in 1913, and purchased the Bedford works and the electrical engineering branch of the Adams Manufacturing Co., Mr. Mould being appointed sales manager of the company, a position which he held until his death. He was appointed a director of the company in June, 1933. He took an active part in various trade associations connected with the electrical industry, and served on committees and panels of the B.E.A.M.A., the F.B.I., and the B.S.I. He played an active part in 1925 in the formation of the Radio Manufacturers' Association, and was a trustee and member of the Executive Council from its formation. He was vice-chairman of the R.M.A. in 1928, chairman in 1929, and since 1930 had been a vice-president.

The late Mr. J. T. Mould

Electricity in a News Theatre

AT the News Cinema, which has lately been opened in Piccadilly, London, W., the Dulrae low-temperature electric ceiling panel system has been installed for warming the main staircase and entrance, using 95 sq. feet of heating surface. This is entirely under thermostatic control, an even and constant temperature being maintained under all conditions. The corridors and paybox are warmed by means of electric hot-water radiators, with a total heating surface of 72 sq. ft., and a loading of 5½ kW. These are also under thermostatic control. Oval tubular heaters, at high and low level, warm the staff rooms, where a constant temperature is also maintained by use of a thermostat. The auditorium heating, however, is carried out by means of warm air passing through the ventilation ducts, 50 kW of heaters being used.

A system of fresh air supply and vitiated air extract has been provided. The plant has two different ratings, one for summer and one for winter duty. The fresh air fan duty is 6,600 cu. ft. min. in summer, and 4,750 cu. ft. min. in winter, the former being at the rate of 1,670 cu. ft. min. per person, and the latter 1,000 cu. ft. min. per person. The extract fan duties are in each case 75 per cent. of the system. The high duty for summer use is to provide a cooling effect, since the circulation of large quantities of air is pleasing, and produces the sensation of coolness.



The plant for the provision of fresh air consists of a viscous filter, electric air heater, and fan and motor combination. The viscous filter is of nine cells, and was manufactured by the Premier Cooler Co.

The electric air heater, of 50-kW capacity, is designed to raise the temperature of the incoming air by 33 deg. F. It is thermostatically controlled, and is provided with safety interlocks on access doors and fan motor. Its operation can be either automatic or manual, as desired. The heating elements used are the "Chromalox" finned type of Messrs. G. Bray & Co., Ltd. The fan, manufactured by the Keith, Blackman Co., is connected to the ductwork through flexible connections, and the complete fan and motor combination is mounted on a special sound-insulating base. The fan is driven through a silent vee rope drive by a "super-silent" motor manufactured by Bull Motors. The motor controller is of the Brookhirst straight-on type, provided with suitable protection gear.

The extract fan, mounted on the roof above the back of the cinema, is of the weatherproof type, and the general arrangements of fan and motor combination are similar to the fresh air plant, the various components being by the same manufacturers. The fan is remote controlled from the fresh air plant chamber, and the whole of the ventilation plant control is therefore centralised.

Separate systems are provided for lavatory and projection room ventilation, the former being at the rate of six changes of air per hour, and the latter four changes. The metal ductwork was supplied by Air Ducts, Ltd., and the entire installation of the heating and ventilating systems was carried out by Messrs. Richard Crittall & Co., Ltd. Lighting fittings were supplied and wiring was carried out by Messrs. Troughton & Young, Ltd. An exterior neon sign was provided by Claude-General Neon Lights, Ltd.

Two views of the News Theatre, Piccadilly, W., which was recently opened

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Radio Film Programmes, Ltd.—Private company. Registered September 6th. Capital, £100 in £1 shares. Objects: To carry on business as wireless telegraphic, telephonic and general engineers, mechanical and electrical engineers, manufacturers of gramophone records, electric recording and other instruments, proprietors and publishers of newspapers, books, &c. The subscribers are: G. Shanks, Duneeran, Weybridge, Surrey; and M. E. Needham, 40, Hatherley Road, Sidcup, Kent. Secretary: M. E. Needham. Registered office: 8, Duchess Street, W.1.

Worcester Radio Relay Service, Ltd.—Private company. Registered September 5th. Capital, £100 in £1 shares. Objects: To establish and maintain wireless signal and other stations for the reception or distribution of wireless or radio signals or waves, &c. The subscribers include the Gwalia Radio Relay Services, Ltd., of 26/28, Millicent Street, Cardiff. The first directors are: J. F. Powell, "Uplands," Uplands Road, Clacton-on-Sea, and three others. Registered office: 1, High Street, Worcester.

A. C. France (Kensington), Ltd.—Private company. Registered September 5th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical contractors and general electrical engineers, manufacturers of and dealers in electrical fittings, &c. G. W. France, 74, Earl's Court Road, Kensington, W.8, is permanent managing director. Secretary: G. Russell, 35, Hartingdon Road, West Ealing, W.13.

B.E.C. (British Electrical Corporation), Ltd.—Private company. Registered September 3rd. Capital, £100 in £1 shares Objects: To carry on the business of dealers in electric lamps, all kinds of lighting equipment, gas and electrical goods, radio goods, automobile equipment, &c. The subscribers are: S. Retziman, 26, Gloucester Place, W.1; and R. H. T. Newman, 49, Wray Crescent, Tollington Park, N.4. Registered office: Aldwych House, Aldwych, W.C.2.

Herald Electric Stores, Ltd.—Private company. Registered September 7th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in gramophones and sound reproducing machines, wireless and electrical components, &c. The directors are: Mrs. E. Reed, 11, Farnham Road, Seven Kings, Essex; and H. Lorie, 83, High Street, Notting Hill Gate, N.W. Secretary: Wm. T. Robins. Registered office: 83, High Street, Notting Hill Gate, W.11.

Tyneside Radio Supplies, Ltd.—Private company. Registered September 8th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in gramophones and sound reproducing machines, automatic machines, wireless and electrical components, &c. The directors are: R. L. Elder and Mrs. Elizabeth K. Elder, both of 4, Belle Grove West, Newcastle-on-Tyne. Secretary: R. L. Elder. Registered office: 12, Eldon Place, Newcastle-on-Tyne.

Northern Rental Corporation, Ltd.—Private company. Registered September 8th. Capital, £1,000 in £1 shares. Objects: To carry on the business of dealers in and letters on hire or on hire-purchase or other terms of wireless receivers, wireless receiving and television sets, sound producing, amplifying and acoustical instruments and radio-gramophones, &c. The first directors are: B. W. J. Bryan-Rennell, 29, Sandhurst Avenue, Withington, Manchester; and E. G. Turner, Old Colony House, South King Street, Manchester. Registered office: 30, Deansgate Arcade, Manchester.

S.H. Radio Services, Ltd.—Private company. Registered August 29th. Nominal capital, £200 in £1 shares (100 ordinary and 100 7½ per cent. preference). Objects: To acquire the assets, undertaking and liabilities of the business carried on by Sir Redvers B. Stone and J. M. Hattersley as "Stewart's Radio Stores," at 145, Wandsworth Road, S.W.8, and to manufacture or deal in radio, television, musical goods, sets, apparatus, accessories, &c. The first directors are: J. M. Hattersley, 70, Sutherland Avenue, W.9, and Sir Redvers B. Stone, 11, Ludlow Road, Wandsworth, S.W.18. Secretary: J. M. Hattersley. Registered offices: 11 and 12, Southampton Buildings, W.C.2.

Longlamps, Ltd.—Private company. Registered August 29th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and exporters and importers of all kinds of glass vacuum tubes or lamps, &c. The subscribers are: S. W. Wrekins, Chesham House, Broxbourne, Herts, and E. Weinbaum, 95, Bethune Road, N.16. E. Weinbaum signs as director. Registered office: 22, Ely Place, E.C.1.

Electric Newspapers, Ltd.—Private company. Registered September 6th. Capital, £4,000 in £1 shares. Objects: To acquire the business of an advertiser heretofore carried on by Richard F. B. O'Callaghan at 26, Cabinet Chambers, Basinghall Street, Leeds, and to carry on the business of manufacturers, erectors and operators of ambulatory electric signs for displaying news items and advertisements, &c. The first directors are: R. F. B. O'Callaghan, 34, Blackett Street, Newcastle-on-Tyne; and R. H. Haswell, 7, Gledhow Park Crescent, Chapel Allerton, Leeds, 7. R. H. Haswell is permanent managing director so long as he holds 100 shares. Solicitors: Lionel Altman, 4, Park Square, Leeds.

Industrial Radiographs, Ltd.—Private company. Registered September 4th. Capital, £1,000 in £1 shares. Objects: To acquire the business of industrial X-ray specialists carried on by W. G. Allen and Dorothee L. K. Allen at Hagley, Worcs. The first directors are: W. G. Allen and Mrs. Dorothee L. K. Allen, both of The Manor House, West Hagley, Worcs. Secretary W. G. Allen. Registered office: 28/9, Wolverhampton Street, Dudley.

Modern Appliance Distribution Co., Ltd.—Private company. Registered September 4th. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, radio, heating and lighting engineers, experts and contractors, manufacturers of and dealers in electrical, mechanical or other appliance or device, lamps, fires, cookers, &c. The first directors are: F. G. R. Orme, 2, Merwood Grove, Victoria Park, Manchester, and two others.

Utilities Finance Co., Ltd.—Private company. Registered September 3rd. Capital, £500 in £1 shares. Objects: To carry on the business of hire-purchase financiers, and in particular to finance the sale by way of hire-purchase, deferred payments or otherwise, of wireless and electrical appliances, apparatus and fittings, &c. The first directors are: J. R. Hey, 11, Maple Place, Meir, Stoke-on-Trent; and S. Smith, 50, Queensmead Road, Meir, Stoke-on-Trent.

Returns of Electrical Companies

Accumulators of Woking (1928), Ltd.—Capital, £10,000 in £1 shares. Return dated April 26th, 1934. 8,501 shares taken up. £4,501 paid. £4,000 considered as paid. Mortgages and charges, £8,000.

W. J. Furse & Co., Ltd.—Capital, £35,000 in 9,000 preference and 26,000 ordinary shares of £1 each. Return dated April 25th, 1934. 9,000 preference and 21,029 ordinary shares taken up. £10,735 paid on 10,735 ordinary shares. £19,294 considered as paid on 9,000 preference and 10,294 ordinary shares. Mortgages and charges, nil. Return of allotments made up to June 27th, 1934, shows a further 1,831 ordinary shares allotted, payable in cash and fully called up.

George Ellis, Ltd.—Capital, £2,000 in £1 shares. Return dated April 12th, 1934. 1,152 shares taken up. £2 paid. £1,150 considered as paid. Mortgages and charges, none registered.

Electricity Distribution of North Wales and District, Ltd.—Capital, £205,500 in 200,000 preference shares of £1 and 110,000 ordinary shares of 1s. Return dated May 26th, 1934. All shares taken up. £202,000 paid on 200,000 preference and 40,000 ordinary shares. £3,500 considered as paid on 70,000 ordinary shares. Mortgages and charges, £113,250.

Rangoon Electric Tramway & Supply Co., Ltd.—Capital, £500,000 in 250,000 preference and 550,000 ordinary shares of £1. Return dated May 10th, 1934. All shares taken up. £735,000 paid on 250,000 preference and 485,000 ordinary shares. £65,000 considered as paid on 65,000 ordinary shares. Mortgages and charges, £300,000.

West London & Provincial Electric and General Trust, Ltd.—Capital stock, £390,000 in £198,000 ordinary and £192,000 5 per cent. preference stock. Return dated May 17th, 1934. All stock taken up. £264,000 paid. £126,000 considered as paid. Mortgages and charges, nil.

E. Jeffery, Ltd.—E. S. Macfie, 26, Charing Cross Road, W.C.2, was appointed receiver on June 2nd, 1934, under powers contained in debenture dated July 1st, 1930, in place of H. V. Went, who retired on June 1st, 1934. (Notice filed August 30th.)

Plew Television, Ltd.—Debenture dated August 25th, 1934, to secure £200, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: F. A. R. Paton, Heathercliffe, Helsby, via Warrington.

Radio Instruments, Ltd.—Satisfaction in full on August 10th, 1934, of memorandum of deposit of deeds dated October 16th, 1930, and registered October 17th, 1930. (According to the register of mortgages, the only instrument registered October 17th, 1930, was a charge which originally secured all moneys due to bank.)

Austin Brothers Electrical Co., Ltd.—Capital, £1,000 in 300 preference and 700 ordinary shares of £1. Return dated May 30th, 1934. All shares taken up. £700 paid. £300 considered as paid. Mortgages and charges, nil.

Acme Electric Lamp Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 23rd, 1934. All shares taken up. £2 paid. £998 considered as paid. Mortgages and charges, nil.

Willans & Robinson, Ltd.—Capital, £173,165 5s. in £30,000 "A" preference stock, £141,665 5s. "B" preference stock and 30,000 ordinary shares of 1s. Return dated May 10th, 1934. All stock and shares taken up. £142,431 10s paid. £30,733 15s. considered as paid. Mortgages and charges, £64,015.

Urban Electric Supply Co., Ltd.—Capital, £1,050,000 in 700,000 ordinary and 350,000 6 per cent. cumulative preference shares of £1 each. Return dated May 31st, 1934. All shares taken up. £675,025 paid on 425,025 ordinary and 250,000 preference shares. £374,975 considered as paid on 274,975 ordinary and 100,000 preference shares. Mortgages and charges, nil.

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in 100,000 6 per cent. preference, 200,000 5 per cent. second preference, and 4,320,000 ordinary shares, all of £1. Return dated May 10th, 1934. 100,000 6 per cent. preference, 179,056 second preference and 4,299,656 ordinary shares taken up. £1,029,884 paid on the second preference and 850,828 ordinary shares. £3,548,828 considered as paid on the 6 per cent. preference and 3,448,828 ordinary shares. Mortgages and charges, nil.

British Heaters (Camberwell), Ltd.—Deed of indemnity dated August 28th, 1934, charged on the company's undertaking and property, including uncalled capital, to all sums which the chargee (S. W. Cole, Footscray Lane, Sidcup) may be called upon to pay under any guarantee given at the request of the company.

City Notes

Murex, Ltd., proposes to pay a final ordinary dividend of 20 per cent., less tax, making the total distribution for the year 35 per cent. as compared with 30 per cent. for 1932-33. It is also proposed, owing to the continued expansion of the business, to increase the capital, and to offer ordinary shareholders a further 90,000 ordinary 10s. shares at £4 per share. It is considered desirable that the issued capital should be brought into closer relation to the capital actually employed in the business, and it is intended, as soon as the final instalment of the new issue has been paid, to make a bonus issue of fully paid ordinary shares to ordinary shareholders on a share-for-share basis, sufficient reserves being capitalised for the purpose, and subsequently to consolidate the whole of the then existing 10s. ordinary shares into £1 shares fully paid. When consolidated the ordinary shares will rank equally for dividend with the existing capital from July 1st, 1934.

The Lightfoot Refrigeration Co., Ltd., reports trading profits for 1933 of £23,273, as compared with £18,487 in the preceding year, and after providing for depreciation, debenture interest, &c., there is a net loss of £15,653 (against £17,073). To this is added £13,821 written off patterns, tools, patents, development expenditure, &c., and a debit of £17,870 brought in, and after crediting profit on sale of investments and ground lease (£1,328) and tax reserve not required (£736), there is a debit carried forward of £45,281.

Edmundson's Electricity Corporation, Ltd.—The results of the operations of the Edmundson group of companies during August as compared with the corresponding month of 1933 show an increase of 11 per cent. in kWh sold.

Companies to be Struck Off the Register.—The names of the following companies will be struck off the Register at the expiration of three months, unless cause is shown to the contrary:—Bower Electric (1926), Ltd.; Ferrow Electrical Co., Ltd., H.T.C. Electrical Co., Ltd.; Midland Electric Lamp Co., Ltd.; Electro-Acoustics, Ltd.; Electro-Therapeutic Supply Co., Ltd.; Kitson Lights, Pumps & Refrigerators, Ltd.; Radio-Acoustics, Ltd.

British Insulated Cables, Ltd., has declared an interim dividend of 5 per cent. on the ordinary shares (same).

Stocks and Shares

TUESDAY EVENING.

PRICES of gilt-edged stocks and gilt-edged shares, together with such of those of the ordinary class which may be justifiably included in the same category, stand to-day at higher prices than they have reached within the memory of most of us. It is true that Consols and British Government securities went to higher figures about forty years back, but when the difference of income tax is taken into account, and the range of values is measured by the net yield which stocks and shares afford, the prices of to-day compare favourably—or unfavourably, according to whether a man is a holder or a prospective buyer—with those of many years. This state of affairs is due to a number of factors, the list of which might well occupy a column here. Chief amongst them may be mentioned the 2 per cent. Bank Rate that came into force in June, 1932, followed, as it was, by such a set of disturbances on the Continent and in the United States as compelled money to seek the shelter and the safety of British stocks, until to-day the latter must stand at something like famine prices.

Ordinary v. Preference

Nor is the appetite for such securities slaked by the new issues that periodically appear. The prospect is that prices will go yet higher, before a possible hardening of money rates will offer more profitable employment to capital than can be obtained to-day through its investment in first-class stocks. The prices for debenture stocks and for preference issues have attained a range at which the investor is a little shy of making purchases. The inevitable consequence is to force attention to the ordinary shares of those companies whose prior charges stand at high values. The movement in favour of ordinary shares gathers weight with every week. Its influence may be seen in the rises that are taking place in shares of the manufacturing and equipment companies connected with the supply of electricity and its manifold ramifications. British Insulated ordinary have strengthened to 73s. 9d., ex the interim dividend of 5 per cent. For years past, the full dividend for the year has been 15 per cent. Associated Electrical Industries preference have risen to 32s. 6d.; Johnson & Phillips are again harder, at 25s., upon dividend anticipations, Siemens ordinary strengthened to 18s. 9d., Crompton Parkinson ordinary are 1s. 6d. higher at 27s. There is a steady demand for Callenders, Enfields, Henleys and General Electrics. Notwithstanding the high prices to which preference shares have advanced, and the diffidence, already mentioned, of investment in putting money into shares at to-day's figures, the good preferences continue to be steadily absorbed.

Electricity Supply Shares

Great are the discussions going on at the present time with reference to the manner in which the reform of electricity distribution can best be brought into operation. The grid system, whatever its opponents may say, has proved, up to the present, a success from its promoters' point of view. The next step, according to those who are bent upon securing a reduction in the price of electrical power, must lie in the direction of obtaining closer working connection between the grid on the one hand and the customer on the other. Holders of shares in the electricity supply companies will watch these discussions with keen interest. The drift of them appears, to the outside observer, to lie in the direction of unification along the lines already adopted by the Metropolitan Water Board and similar public bodies. Looking for tangible probabilities, that same observer will visualise a prospect of his security becoming worth more, from the Stock Exchange point of view, than it is to-day, following the example set by the stocks of the London Passenger Transport Board, to take the most obvious, as it is the latest, instance of such amalgamations.

Bournemouth and Poole are $\frac{1}{16}$ harder at 78s. 9d. A few ex dividend markings have exercised no particular effect upon prices. Edmundson's at 38s. 4½d. are unchanged. The company states that, compared with August, 1933, the results of the group for last month show an increase of 11 per cent. in the number of units sold. East Africans are a few pence better at 33s. 9d.

Cables and Wireless

The improvement which started a fortnight ago in the Cables and Wireless market has made further progress. In the search for investments, speculative and otherwise, the 5½ per cent. preference issue of the Cables Combine has attracted attention, and the last-published revenue ratio is deemed to hold out some reasonable hope of increase in the dividend in respect of the present year. The price has moved up to 75, and, in sympathy, the "A" ordinary stock to 17¼. The "B" ordinary stock, a gambling counter, is harder at 8. These improvements brought about a sympathetic gain in Globe Telegraph ordinary shares, and the market for cable stocks, generally speaking, is looking more healthy than it has done for some time past. Great Northern Telegraphs at 37½ show a gain of £1. The transatlantic stocks are better. American Telephone and Telegraph stock is a point higher at 111½. Internationals, however, remain dull at 9¼.

Mexican Matters

The falls that took place last week in the bonds of the Mexico Tramways and the Mexican Light & Power Companies have not been recovered, although the news from Mexico suggests that affairs in that unhappy country are moving in the right direction for holders of what had better be called Mexican insecurities. The Mexico Tramways, in its twentieth annual report, says: "There has been no improvement in the result of the operations in Mexico during the past year." The Federal Board of Arbitration, in an award dated August 3rd, grants the company trifling benefits. As the effects of the awards have been temporarily suspended by strong opposition from the employés, the matter may be regarded as still in doubt. The annual meeting of the company will be held in Toronto on Friday, September 28th, and on the same day the annual meeting of the Mexican Light & Power will also take place. The latter company's accounts for the year again show a substantial shortage, which has been carried to the debit of profit and loss. Business in the bonds has been reduced to a minimum. Other dollar securities are also quiet, as regards Stock Exchange trading. Brazilian Tractions weakened to 10⅛. The volume of business in American stocks and shares has shrunk to such an extent that certain of the American financial houses which have been running London offices are closing down on this side.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Sept. 11.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	78/9	+1/16	3 16 2
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/6	—	4 1 2
Chelsea	1	7	7	34/–	—	4 2 4
City of London	1	7½	7½	36/3	—	4 2 0
Clyde Valley	1	7	7	38/9	—	3 12 3
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	34/6	—	4 1 2
Elec. Dis. Yorkshire	1	9	9	47/6	—	3 15 0
Elec. Supply Corporation	1	11	11	60/9	—	3 12 4
Kensington Ordinary	1	7	7	34/–	—	4 2 4
Lancs Light and Power	1	7	7½	37/6	—	4 0 0
London Electric	1	7	7	34/–	—	4 2 4
Metropolitan	1	10	10	53/9	—	3 14 6
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	33/–xd	+6d.	3 12 10
Do. 7% Pref.	1	7	7	35/–xd	+6d.	4 0 0
Northampton	1	10	10	53/–	—	3 15 4
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary	1	10	10	3½	—	3 4 0
Do. do. 6% Pref.	1	6	6	31/6	—	3 16 2
St. James' and Pall Mall	1	7	7½	36/–	—	4 3 4
Scottish Power	1	8	8	40/–	—	4 0 0
South London	1	7	7	35/6xd	—	3 19 0
Westminster Ordinary	1	7	7	34/–xd	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	46/3	—	3 9 1

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	115	—	4 7 0
Do. 1955–75	,,	5	5	116	—	4 4 9
Do. 1951–73	,,	4½	4½	110	—	4 1 10
Do. 1963–93	,,	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	,,	4½	4½	110	—	4 1 10
London Passenger Transport, A	,,	—	4½	121	—	3 14 5
Do. do. B	,,	—	5	125	—	4 0 0
Do. do. C	,,	—	3	80	—	3 15 0
West Midlands Joint Elec. 1948–68	,,	—	5	113	—	4 8 6

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	111½	+1	8 1 5
Anglo-Am. Tel. Pref.	Stock	6	6	112	—	5 7 2
Do. Def.	,,	1½	1½	27	—	5 11 1
Cables & Wireless 5½% Pref.	,,	2⅝	2⅝	75	+2½	3 13 4
Do. A. 7½% Ord.	,,	Nil	Nil	17¼	+2	—
Do. B. Ord.	,,	Nil	Nil	8	+⅛	—
Globe Tel. and T. Ord.	10	Nil	2½	9¼xd	+11/–	2 11 4
Do. do. Pref.	10	6	6	12½xd	+⅛	4 16 0
Great Northern Tel.	10	20	20	37½	+1	5 6 7
Marconi-Marine	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 15 3

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5½	—	—
British Electric Traction Df. Ord.	,,	5	5	685	—	—
Do. do. Pref. Ord.	,,	8	8	160½	—	4 19 8
Brazil Traction	100	—	—	10½	–½	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds	—	5	5	20½	—	—
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	—	5	5	35	—	—
Victoria Falls Ord.	1	15	20	6 7/16	—	3 2 0
Yorkshire (West Riding)	1	2½	5	25/–	—	4 0 0

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	10	3	—	3 6 8
Assoc. Elec. Ord.	1	4	3	21/6	—	2 15 10
Do. Prf.	1	8	8	32/6	+6d.	4 18 6
Babcock & Wilcox	1	9	6	43/6	–6d.	2 15 2
British Aluminium Ord.	1	5	5	28/3	—	3 11 0
British Insulated Ord.	1	15	15	73/6xd	+1/3	4 1 3
Brush Ord.	Stock	Nil	Nil	33	—	—
Callender's	1	15	15	3½	—	4 12 4
Do. 6½% Prcf.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/–	22½	12½	27/–	+1/6	4 12 7
Do. 8% Pref.	1	8	8	33/9	—	4 14 10
Edison-Swan 1st Pref.	1	7½	7½	21/3	—	7 1 2
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	11/3	—	—
Enfield Cable Ord.	1	25	20	85/–	—	4 14 1
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	10/9	+9d.	—
Ever Ready	5/–	35	35	27/6	–6d.	6 7 3
Ferranti Pref.	1	7	7	26/6	—	5 5 8
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	46/3	—	3 9 3
Henley's	1	30	30	6½	—	4 17 8
Do. 4½% Pref.	5	4½	4½	5½	—	4 1 9
India-Rubber Preferred	1	—	—	18/9	—	—
Johnson & Phillips	1	5	5	25/–	+6d.	4 0 0
Siemens Ord.	1	6½	4	18/9	+1/16	4 5 4
Telegraph Construction	£1	Nil	Nil	1	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

32496. "Electric switches of the quick-make and quick-break type." J. A. Crabtree and B. G. Harrison. November 17th, 1932. (415084.)

35627. "Rolling of helically twisted electrical conductors." Felten & Guilleaume Carlswerk Akt.-Ges. December 15th, 1931. (Cognate applications 35628/32 and 35629/32.) (415043.)

1933

1448 "Cathode-ray tubes." Electric & Musical Industries, Ltd., W. F. Tedham and J. D. McGee. January 16th, 1933. (415071.)

1724. "Electric luminous discharge tubes." F. Rother. January 18th, 1932. (415111.)

1834. "Electric discharge lamps." F. Rother. January 19th, 1932. (415113.)

1853. "Electricity meters." F. Holden and Measurement, Ltd. January 19th, 1933. (415114.)

4033. "Electrical devices for the heating of rooms." E. Runte. February 12th, 1932. (415047.)

4181. "Electrical power systems for mechanically propelled vehicles and other purposes." C. Corbridge and Associated Electrical Industries, Ltd. February 10th, 1933. (415092.)

4456. "Flameproof seals for electric conductors." Bruce Peebles & Co., Ltd., and J. W. Rodger. February 14th, 1933. (415033.)

4521. "Electrodes for arc welding." E. J. Clarke and Murex Welding Processes, Ltd. February 14th, 1933. (415035.)

4524. "Television apparatus and the like." J. L. Baird and Baird Television, Ltd. February 14th, 1933. (415036.)

4589. "Television and the like systems." Electric & Musical Industries, Ltd., and C. O. Browne. February 15th, 1933. (415118.)

4804. "Amplifiers and electron-discharge devices therefor." L. L. de Kramolin. February 17th, 1932. (415079.)

4930. "Tuning and indicating devices for radio-receiving sets." Standard Telephones & Cables, Ltd., and A. K. Young. February 17th, 1933. (415101.)

5006. "Electrically heated hot-plates." L. Nicholson, W. Needham and Associated Electrical Industries, Ltd. February 17th, 1933. (Addition to 363774.) (415107.)

5221. "Electric switches employing mercury contacts." British Sangamo Co., Ltd., and F. R. Lutherus. February 20th, 1933. (415128.)

5561. "High-tension electric transmission systems." Standard Telephones & Cables, Ltd., and J. K. Webb. February 23rd, 1933. (415137.)

5586. "Directional aerial systems." Marconi's Wireless Telegraphs Co., Ltd. E. Green. February 23rd, 1933. (415141.)

5587. "Electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and N. M. Rust. February 23rd, 1933. (Addition to 400995.) (415142.)

5608. "Cathode-ray tubes." Electric & Musical Industries, Ltd., and J. D. McGee. February 23rd, 1933. (415143.)

5616. "Electric battery lamps." Bluemel Bros., Ltd., and F. W. Bluemel, C. E. Bruce and F. P. Swann (legal representatives of F. H. Bluemel (deceased)). February 23rd, 1933. (415144.)

6441. "Thermionic amplifiers and the like." P. V. Reveley and Baird Television, Ltd. March 2nd, 1933. (415155.)

7580. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 12th, 1932. (415165.)

7581. "Electric discharge tubes or the like." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 12th, 1932. (415166.)

7614. "Electrical synchronous motors for operating clocks and the like mechanism." H. W. Hollands. March 13th, 1933. (415168.)

8342. "Electric transmission systems." D. McMillan and J. F. Doust. March 20th, 1933. (415173.)

8479. "Equipment for the recording of sound on talking picture films." S. T. Dall. March 21st, 1933. (415177.)

8858. "Electric discharge tubes, particularly gas-filled luminous tubes. W. L. W. Schallreuter. March 28th, 1933. (415183.)

9545. "Stoneware and other conduits for electric cables." Albion Clay Co., Ltd., and G. O. Lawton. March 30th, 1933. (415189.)

10435. "Traffic-actuated signalling apparatus." Siemens & General Electric Railway Signal Co., Ltd., F. G. Tyack and H. J. N. Riddle. April 7th, 1933. (415200.)

11091. "Control of electric motors." Bailey Meter Co. April 14th, 1932. (415204.)

13974. "Methods of uniting metal articles by fusion and resulting products such as electric contact assemblies." C. A. Laise. March 25th, 1933. (415221.)

15013. "Automatic telephone systems." Siemens Bros. & Co., Ltd., and R. G. Dixon. May 24th, 1933. (415225.)

17559. "Protective arrangements for luminous discharge tube signs." Siemens Bros. & Co., Ltd., and E. A. Beavis. June 20th, 1933. (415236.)

17560. "Thermionic valve circuits." Siemens Bros. & Co., Ltd., and L. S. Crutch. June 20th, 1933. (415237.)

18993. "Electrically supervised indicating or alarm control systems." F. A. Gwatkin (Garrison Fire Detecting System, Inc.). July 4th, 1933. (415246.)

20768. "Electric audible signals." Ericsson Telephones, Ltd., and C. W. Wilman. July 24th, 1933. (415255.)

31507. "Electric switching apparatus with time-delay action." C. A. Parsons & Co., Ltd., and H. B. Topham. November 11th, 1933. (Cognate application 3340/34.) (415285.)

32309. "Armature windings for electric commutator machines." L. Dreyfus and Allmänna Svenska Elektriska Aktiebolaget. November 20th, 1933. (415288.)

33193. "Electric cables." H. Milliken and British Insulated Cables, Ltd. April 18th, 1933. (Divided application on No. 11381/33.) (415294.)

34229. "Method of and means for insulating wire." Allgemeine Elektricitäts-Ges. December 9th, 1932. (415299.)

35911. "Automatic electrical circuit-breakers." J. A. Crabtree. December 20th, 1932. (Divided application on 36040/32.) (Cognate application 12481/33.) (415129.)

36143. "Bases for electric incandescent lamps." British Thomson-Houston Co., Ltd. December 24th, 1932. (415308.)

36637. "Thermostatic control of electrically heated sterilisers." Dental Manufacturing Co., Ltd., and W. G. Lee. December 29th, 1933. (415314.)

1934

365. "Electric transformers." British Thomson-Houston Co., Ltd. January 4th, 1933. (415316.)

4980. "Electric battery lamps." Bluemel Bros., Ltd., and F. W. Bluemel, C. E. Bruce and F. P. Swann (legal representatives of F. H. Bluemel, deceased). February 23rd, 1933. (Divided application on 415144.) (415334.)

10707. "Ignition devices for electric discharge apparatus." U. Lamm and Allmänna Svenska Elektriska Aktiebolaget. April 9th, 1934. (415353.)

11972. "Contact construction of electric lamps and thermonic valves." British Thomson-Houston Co., Ltd. April 21st, 1933. (415355.)

13408. "Electric discharge tubes with positive column discharge." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 3rd, 1933. (415358.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 5th:—

Weblite. No. 549714. Class 8. Electric batteries and accumulators (not for medical purposes), dry cells, induction coils, electric meters, condensers, and wireless-telephonic apparatus, &c.—J. M. Webber & Co., Ltd., 39, Great Eastern Street, E.C.2.

Rising Sun (design only). No. 550881. Class 8. Electric batteries (not for medical purposes).—Northern Batteries, Ltd., Mitchell Street, Birtley, Co. Durham.

Firefly. No. 552919. Class 8. Electric batteries (not for medical purposes) and radio receiving sets.—Vidor, Ltd., West Street, Erith, Kent.

Municipal Supply Undertakings' Results

Town.	Engineer.	Total Revenue.		Working Expenses.		Net Profit.		Sales of Electricity.		
								Thousands of kWh.		Percentage Increase.
		1933.	1934.	1933.	1934.	1933.	1934.	1933.	1934.	
		£	£	£	£	£	£			
Accrington	A. W. Clegg	87,545	90,600	41,585	44,815	7,710	9,372	22,062	25,270	14.5
Brighton	W. N. C. Clinch	364,761	405,731	177,035	216,604	36,813	36,189	92,335*	103,698*	12.3
Carlisle	C. W. Salt	115,830	120,693	53,367	58,798	4,786	9,754	25,020	27,182	8.3
Cheltenham	W. J. Bache	‡	86,357	‡	66,461	‡	1,575	8,110	9,042	11.5
Derby	F. Nicholls	261,786	275,433	110,791	114,168	41,154	44,466	40,724	48,390	18.8
Ealing	J. D. Knight†	113,026	126,308	74,116	73,581	4,025	10,455	10,558	12,444	17.0
Edinburgh	E. Seddon	769,499	836,676	486,125	630,183	39,249	30,000	182,119*	265,547*	45.5
Exeter	A. L. Keet	123,920	135,413	68,596	56,164	5,757	3,718	15,396	17,742	15.3
Grimsby	S. R. Windle	143,352	153,842	77,837	81,870	12,998	16,404	28,755	33,402	16.4
Hackney	E. A. Mills	334,303	364,938	157,885	179,152	19,915	35,800	52,059*	74,888*	43.6
Hull	J. N. Waite	524,210	572,980	‡	‡	55,369	80,884	121,958	132,531	9.0
Ipswich	H. E. Blackiston	180,459	206,160	93,873	102,699	22,272	39,820	27,420*	34,077*	24.3
Kettering	W. A. Walker	‡	109,482	‡	59,075	4,775	10,239	12,026	13,534	12.5
Luton	W. H. Cooke	192,562	228,218	94,335	103,880	31,014	54,780	52,385	71,045	35.7
Newport	A. Nichols Moore	200,662	213,559	97,917	105,424	6,104	6,597	38,400	43,270	12.7
Oldham	F. L. Ogden	287,663	305,701	151,513	155,909	10,516	16,032	53,547	60,473	12.9
Rawtenstall	J. E. Shepherd	67,414	77,639	‡	36,839	3,288	5,646	13,481	15,563	15.5
Salford	L. Romero	347,883	378,115	168,820	214,562	35,554	30,837	75,955	86,697	14.1
Sheffield	E. Morgan	961,019	1,036,846	438,055	436,120	139,398	212,519	228,021	256,732	12.6
Southport	E. Moxon	108,231	109,589	50,257	51,483	20,588	20,685	17,653*	18,824*	6.6
Sutton Coldfield	T. Bloore	48,441	51,706	28,120	28,447	1,833	6,617	5,262	6,086	15.7
West Ham	J. W. J. Townley	461,666	493,014	254,216	277,979	27,384	41,365	117,662	125,780	7.0
Willesden		257,961	273,531	193,219	198,844	3,165	4,359	43,794	51,609	18.0

* Including supplies taken by Central Board. † Now retired. ‡ Figures not available.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Houses (38) and flats, Penparke; Llewelyn Jones, borough surveyor, Park Avenue.

Accrington.—Extensions, skating rink, Cannon Street; Wilson & Barlow.

Billingham.—Houses (150); U.D.C. surveyor.

Birmingham.—Bank and shops for Municipal Bank, Brookvale Road, Erdington, with electrical work; J. B. Surman, architect, 19, Cannon Street. Branch bank, Bristol Road South; A. L. Horsburgh, architect, Western Buildings, Livery Street. Factory for J. B. Bruce, Ltd., Holloway Head; Parsons & Morrin, builders, Belgrave Road.

Blackpool.—Houses (148), Acre Gate; Hitchen & Bairstow. Houses (28), Faringdon Avenue; Blackpool Plumbing Co. Houses (18), Low Moor Road; W. Houghton. Houses (26), Newhouse Road; A. & G. R. Fletcher. Development of Warbreck Hill Estate for business premises, &c.; R. Fielding & Son. Shops, house offices, &c., Preston New Road; H. Best. Shops, private hotels, &c., Queen's Drive and Red Bank Road; Mrs. M. V. Hilton.

Bolton.—Houses (14), Florence Avenue; Haddock & Bowling. Houses (30), Hulton Lane Estate, and houses, Tempest Road; F. Holmes. Houses (102), Top Brow Estate, and bus station, Deansgate (£13,900); borough engineer. Elementary school, for the Catholic Authorities of St. Columba, Ripley Street, Tonge Moor, Rev. John O'Dwyer; H. Greenhalgh, architect, 15, Mawdesley Street.

Bootle.—Church, Breeze Hill; Bethel Evangelistic Society Incorporated.

Bournemouth.—Church of St. Stephen (£10,000) with electrical work; Frank A. Grigg & Sons, builders, 32, Portman Road.

Bristol.—Houses (144) and shops, Knowle Estate (£44,156), 142 houses, Southend Estate (£42,683); W. J. Simms, Sons & Cooke, Ltd.

Cambridge.—Houses (24), five shops and tenements; borough surveyor.

Cheadle (CHESHIRE).—Shops and 325 houses, Bolshaw Road and Wilmslow Road; J. L. Edwards, architect, 1, Ridgefield King Street, Manchester.

Cheltenham.—Swimming bath (£12,086); A. Jackman & Sons, Ltd., Slough. Rebuilding scheme for John Lance & Co., Ltd.

Cheshire.—Secondary and central schools, Knutsford, for County E.C.; director of education, Chester.

Chester-le-Street.—Houses (910); R.D.C. surveyor.

Chinley.—Rebuilding, Forge Bleach Works, for J. & J. Hadfield, Ltd., 56, Faulkner Street, Manchester; John W. Swindells, Ltd., builders, Church Road, New Mills, near Stockport.

Clown (DERBYSHIRE).—Houses (24), Bakestone Moor, Whitwell; W. J. Gallagher, R.D.C. surveyor.

Crewe.—Public baths (£50,000) and houses (200); L. Reeves, borough surveyor.

Darlington.—Extensions to Darlington Training College; George Dougill & Sons, builders, Chestnut Street. Houses (26), Brinkburn Avenue, for Bussey & Armstrong.

Devonshire.—School, St. Budeaux, Crownhill (£8,970), for E.C.; education architect, Exeter. School, Kingsteignton (£6,918); S. W. Foster, Ltd., builders.

Dewsbury.—Houses (30), Scopsley Lane, and 74 houses, Heckmondwyke Road; borough engineer and trade contractors. Houses (23), Scout Hill; G. A. Smith.

Dukinfield.—Houses (80), Tame Valley, for F. Wetton, Blackpool.

East Elloe (LINCS).—Houses (134); R.D.C. surveyor.

East Tilbury.—Three-storey factory and houses, for the Bata Shoe Co., Ltd.

Ebbw Vale.—Baptist Church, Newtown; Lewis Jones, architect, Bethcar Street.

Edinburgh.—Houses (44), Ferry Road, for George Stewart, Blantyre; J. A. W. Grant, architect, 25, Rutland Square.

Ellesmere (SALOP).—Houses W. H. Davies, U.D.C. surveyor.

Essex.—Police stations and court houses, Billericay (£11,000), Brentwood (£25,000), Mistley (£6,000), Ongar (£6,000), Witham (£12,000), Pitsea (£12,657), extensions to Hornchurch (£11,000), and 150 police houses (£75,000), for C.C.; clerk, Chelmsford.

Evesham.—Telephone exchange for H.M. Office of Works, King Charles Street, London, S.W.

Felling-on-Tyne.—Public library, Felling and Bill Quay; C. W. Hall, U.D.C. surveyor.

Ferrybridge (PONTEFRACT).—Houses (20), Stump Cross Lane, for J. Pizzey.

Gateshead.—Swimming baths; F. H. Patterson, borough engineer.

Gomersal (YORKS).—Houses (42), Woodlands Road, for Kilbride & Wilson.

Grangemouth.—Houses (160), Almond Row site (£47,000); J. C. Wallace, burgh surveyor, Town Hall.

Halstead.—Houses (28), King's Head; U.D.C. surveyor.

Harpenden.—Cinema and bathing pool, Harpenden-Luton Road; R. Harding, surveyor, Station Road.

Hastings.—Aerodrome, Pebsham (£40,000); borough surveyor. Casual wards, Municipal Hospital (£5,473); R. Cook & Sons, Ltd., builders, Crawley.

Herne Bay.—Head post office, Cavendish Road; Ashford Builders Co., Ltd., builders, Bloomsbury, London.

Hoddesdon.—Houses (80), Rye Park; U.D.C. surveyor.

Inverness.—Houses (104); burgh surveyor.

Irish Free State.—(CORK).—Houses (170), Commons Road; J. R. Boyd-Barrett, architect, 61, South Mall.

Jarrow-on-Tyne.—Houses (160), Monkton; J. Scott-Weir, borough engineer.

Kempston.—Houses (100); 1933 Housing Society, Ltd., Essex House, Essex Street, London, W.C.

Kettering.—Houses (36), Brook Street; engineer and surveyor, Gold Street.

Lanark.—Houses (40), Madder Mains; burgh surveyor.

Liverpool.—Central school, Buckfield Road, for the Society of Christian Brothers De la Salle (£10,000); Pugin & Purcell, architects, 15, Moorfields.

London.—(FOREST HILL).—Flats, Dartmouth Road; Leamington Court Estates, Ltd. (SYDENHAM).—Houses, Peak Hill Garden Estate; Brett & Son. Houses, Southend Lane; T. Spencer Bright. Flats, High Street; Bunting Construction Co., Ltd.

Loughborough.—Employment Exchange; Room 65D, Third Floor, H.M. Office of Works, London, S.W.1.

Louth.—Houses (50); A. F. Hufton & Co., builders, Woodthorpe, Nottingham.

Maidstone.—Police station, Palace Avenue (£13,500); Town Clerk.

Manchester.—Convalescent home, Pendlebury, for the Board of Management of Royal Manchester Children's Hospital, Pendlebury (£20,000); J. W. Beaumont & Sons, 24, Brazennose St. Factory, Sharston Road, Northenden, for W. J. Brookes & Son, Ltd., Old Trafford; F. Briggs, engineer, 136, Eccles New Road, Pendleton, Salford. Furnishing Stores, for Drages, Ltd., Deansgate, with electrical work; Geo. McFarlane & Sons, builders, New York Street, Chorlton-on-Medlock.

Margate.—Extensions to winter gardens entertainment centre; S. C. Ramsey, architect, Pond Street, London, S.W.

Middlesbrough.—Extensions to the Maternity home; S. E. Burgess, borough engineer.

Middlesex.—School, Hounslow Road, Hanworth, for C.C.; County architect, 10, Great George Street, S.W.1.

Midhurst (SUSSEX).—Houses (36); R.D.C. surveyor.

Motherwell.—Alterations and extensions, maternity home (£5,500); burgh surveyor.

Newcaste-on-Tyne.—Houses (396); R. Roberts, housing architect.

Northallerton.—Houses (44), Vicars Croft; U.D.C. surveyor.

North Riding.—Farm institute, Askham Bryan (£88,000), for C.C.; clerk, Northallerton.

Norton-on-Tees.—Houses (24); U.D.C. surveyor.

Oldham.—Houses (212) and bungalows; borough surveyor. Houses (20), Hadfield Street, for Hadfield Building Co.

Oxford.—Houses (120), Marston site; Harris Bros., builders, Marehay, Derby.

Pontefract.—Houses, Monkhill Estate (£4,500); borough engineer.

Ramsgate.—Town hall and Municipal offices; borough engineer.

Renfrewshire.—Three schools, Renfrew Road, East Lane and Marchfield, Paisley (£90,000), for C.C.; architect, County Council, Paisley.

Ross (HEREFORDSHIRE).—Houses (42), Tudorville; U.D.C. surveyor.

St. Helens.—Sewage disposal scheme, Sutton Manor, with pumping station, &c., and houses; A. P. Statham, borough engineer.

Scarborough.—Additions to Manor Hotel, St. Nicholas Cliff; C. Pickard.

Southampton.—Public baths (£30,000); borough surveyor.

South Shields.—Presbyterian Church; Page & Sons, architects, 67, King Street. Rebuilding of the Grand Electric Cinema; J. H. Morton & Sons, architects, Fowler Street.

Stanford-le-Hope (ESSEX).—Cinema and shops, Corringham Road, for Boyce Bros.

Stanhope.—School; F. Willey, architect, 34, Old Elvert.

Stanley (DURHAM).—Houses (126); A. Routledge, U.D.C. surveyor.

Stockport.—Extensions, Stepping Hill Hospital; Peirce & Son, architects, 30, St. Petersgate.

Stockton-on-Tees.—Cinema, High Street; Robert G. Tarran, Ltd., builders, Hull. Hotel, Wolveston Road; W. & T. R. Milburn, architects, 17, Fawcett Street, Sunderland. Rebuilding of the Globe Theatre; P. L. Browne & Sons, architects, Northumberland Street, Newcastle-on-Tyne. School, Newham Grange (£22,486), for Borough E.C.; director of education. Houses (£336); G. Fordy, builder.

Stretford.—Houses (16), Bradfield Road; H. Grimshaw. Factory, Mellors Road; Davis Engineering Co., Ltd. Joint clinic and library, Trafford Park (£2,400); borough engineer. Works extensions, Trafford Park Road; Lancashire Dynamo & Crypto Co., Ltd.

Sunderland.—Entertainments hall, Seaburn; T. P. Collinge, borough engineer. Alterations and additions to the Sunderland Mantle & Gown Co., 53, John Street; J. Huntley & Sons, builders, Marion Street. Extensions to factory, 27, Low Row; S. J. Stephenson & Gillis, architects, 2, Saville Place, Newcastle-on-Tyne.

Swaffham.—Cinema, London Street, for the Swaffham Cinema Co., Ltd., Market Place; J. Owen Bond, architect, 26, Tombland, Norwich.

Swansea.—Houses (200); borough surveyor.

Wallasey.—Two central schools, Coronation Road; Willink & Dod, architects.

Warwickshire.—Additions to the Herbert Fowler School, Arley (£10,000); Wm. Walter Webster, builders, Guilsborough, Northampton. Additions to Hockley Heath School; Jn. Kendall, builders, Boulton Road, Birmingham.

Weston-super-Mare.—Church (£19,500), for the Trustees of Victoria Methodist Church; H. E. Huntley, secretary.

Wolviston.—Hotel, Wolviston Road; W. & T. R. Milburn, architect, Fawcett Street, Sunderland.

York.—Houses (40), Green Dykes Lane; H. Williamson.